

BY JOHN TEBBEL

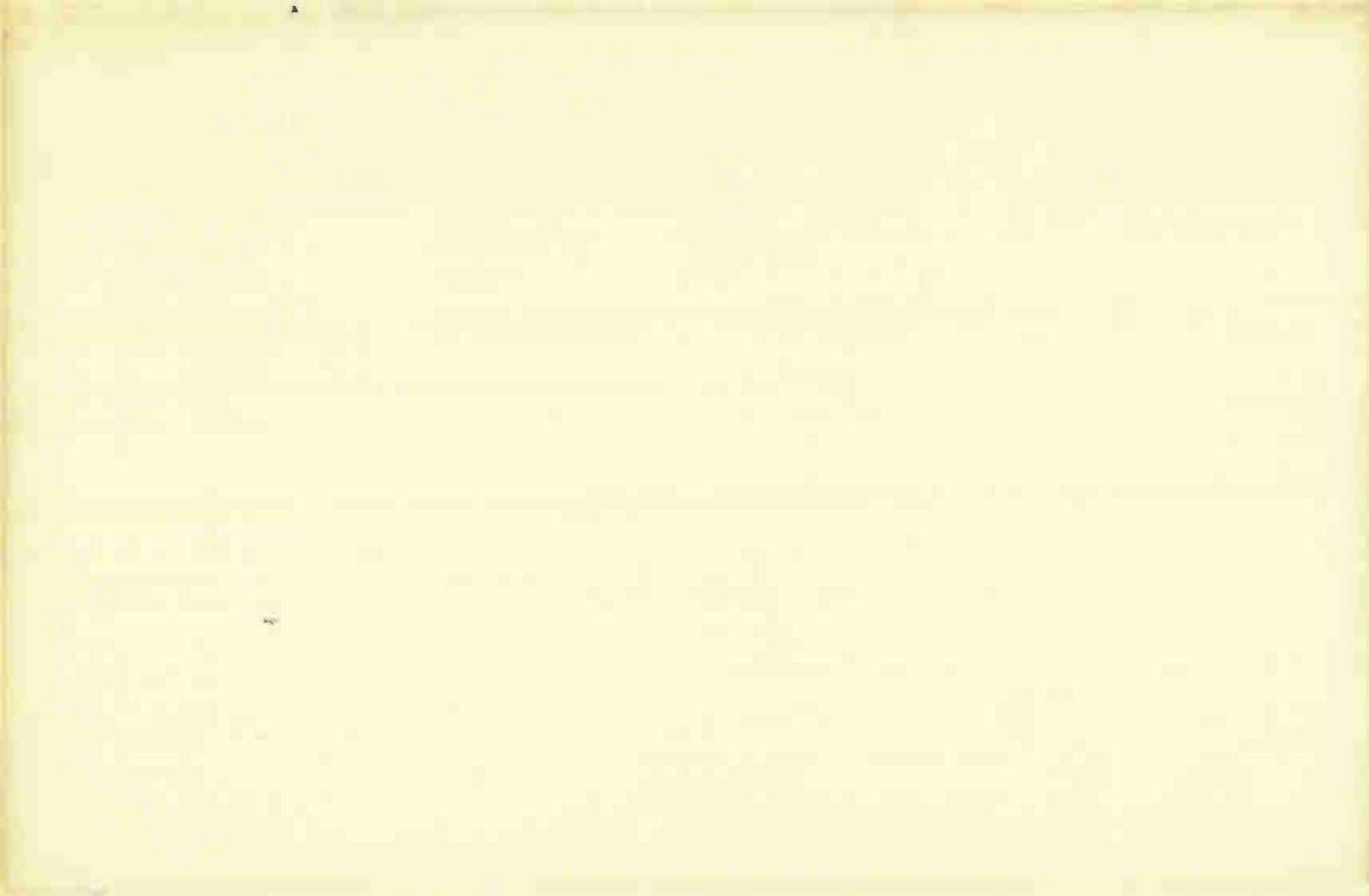
**Putting electrons to work**

# David Sarnoff



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# John Tebbel

Although John Tebbel, author of *David Sarnoff: Putting Electrons to Work*, has written a dozen books, both fact and fiction, it seems unlikely that any of his factual subjects have the fiction-like wonder of his present one, nor that his fiction is more fabulous than this fact.

Born in Boyne City, Michigan, in 1912, Tebbel has given the lie to the old adage "Those who can, do; those who can't, teach." For he has had wide experience in newspaper, magazine, and book writing and editing, and has also taught at the School of Journalism of Columbia University, served as chairman of the Department of Journalism of New York University and as director of its Graduate Institute of Publishing. Educated at the Central Michigan College of Education and Columbia University, he has written for and served as an editor on the *Detroit Free Press*, the *Providence, Rhode Island Journal*, and the *New York Times*, and has been editor of the *American Mercury*. His *The Inheritors* (1962) is a trenchant study of what happened to American fortunes when the men who made them passed them on.

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# DAVID SARNOFF

BY JOHN TEBBEL

David Sarnoff, Chairman of the Board of Radio Corporation of America, directs from his office in a New York skyscraper the greatest electronics empire in the world—radio, television, recordings, computers, and space communications. His career began as office boy for the Commercial Cable Company at 15, and he soon became a wireless telegraph operator for the Marconi Company. He served at several lonely stations, using his spare time to teach himself everything he could learn about radio. He was one of the pioneer radio operators in the Arctic sealing fleet. In 1912 while serving as a wireless telegraph operator for the Wanamaker store, he picked up and made available to the world the first news of the sinking of the luxury liner *Titanic*. For 72 hours he stayed at his key, the single link between the disaster scene and the outside world.

In 1916, as commercial manager for the Marconi Company, he provided an amazingly accurate prediction of the feasibility of radio broadcasting to homes. Years later, after the formation of RCA, he made this prophecy come true. He introduced radio network broadcasting and first brought fine symphonic music regularly to American homes. At the same time, he was encouraging and directing the development of television and later color television. RCA, under his leadership, was also in the forefront of space communications with the development of the Relay and Tiros satellites.

David Sarnoff in his 70's is still looking to the future, a future in which the young people of today will play so important a part. Both his life story and his words of counsel are evidence of how great that future can be.



Putting Electrons to Work  
DAVID SARNOFF





KARSH, OTTAWA

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Putting Electrons to Work

# DAVID SARNOFF

by John Tebbel

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For  
CINDY AND JOHNNY  
caretakers of the future



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## *Chapter 1*

# Portrait of a Genius

**O**n the remote 53rd floor of the RCA Building, behind a leather-topped desk in a handsome limed-oak office, at the center of the complex known to millions of Americans as Radio City, sits a stocky, dynamic man who has probably affected the daily lives of more Americans than any other human being. He gave them radio and television. At 72, he is planning to give them the keys to space. His name is David Sarnoff, chairman of the board of Radio Corporation of America, unquestionably the most powerful man the history of communications has ever known, a man who has made the future come true.

If it is possible he is lonely at the lofty summit of the empire he has created, it is equally true that the prospect he surveys would intimidate most other men. Sar-

noff is in direct and more or less absolute control of a vast network of sound and sight that embraces the earth. There is the National Broadcasting Company, whose radio and television stations bring the world to the doorstep of the listening and watching audience of the United States. There is the RCA Victor Record Division whose records spin on millions of turntables, many of them manufactured by the company itself. RCA Laboratories are busy perfecting the old wonders and inventing new ones. RCA Communications, Inc., has more than 80 radiotelegraph circuits that send messages into every part of the world—more than 200,000,000 words a year. Its Leased Channel Service makes international teletype communication possible for stockbrokers, airlines, and thousands of merchants, domestic and international, as well as federal agencies.

RCA itself is in the manufacturing business. Its 18 plants make every kind of radio or related gadget, and television sets, phonographs, electron microscopes, and computers among other things.

Sarnoff, in brief, heads a giant corporation which is involved in show business, news gathering, advertising, manufacturing, broadcasting, patent licensing, commercial communications, and research. All told it employs about 100,000 people in its 30 American manufacturing locations and 13 others abroad, and grosses nearly \$2,000,000,000 a year.

What kind of man sits at the controls of this empire, of which even Alexander could never have

dreamed, and how did he get there? The answer is at once a legend and a story largely unknown to a new generation of young Americans, looking off into space and unaware that the man who provides the window they look through is the same man who brought those commonplace devices, radio and television, to their fathers and mothers.

For David Sarnoff's career has spanned the most exciting era in American life, the past half-century, when the tree of the nineteenth century industrial revolution burst into the overpowering bloom of twentieth century technology. He saw it happen; he has done as much as one man could do to make it happen. His story has been called, aptly, one of the great romances of industry, but it is more than that. It is a story unique in the chronicles of the men who made the nation, because it combines the supreme adventure of ideas with the more familiar story of business success.

Superficially the Sarnoff story is based on the old conventional rags-to-riches theme, the rise of a poor immigrant boy from the lower East Side of New York to success by dint of hard work and virtue. The General, as everyone calls Sarnoff, plainly dislikes the comparison, and with reason. Where the conventional nineteenth century version of "success" was a simple rise to wealth, Sarnoff has a different conception of the word.

"Success results when a man has the opportunity to express unimpeded the forces within him, whatever they may be," he says. "To be able to develop and

enjoy these forces is the greatest measure of success. And wealth is not an evidence of success, contrary to popular opinion, nor is its possession an evidence of achievement."

Like his friend Bernard Baruch, the General does not consider himself a rich man, and he is far from having anywhere near Baruch's wealth. Baruch, whose fortune is estimated at somewhere near \$25,000,000, often says—and with truth—that if he had not decided in 1912 to devote most of his time to public service, he would be a rich man today—meaning that his fortune would be three or four times greater, like those of his contemporaries who devoted themselves to making money. Similarly, Sarnoff, whose salary is reported as \$200,000 a year and who lives in a style within the reach of comparatively few men, nevertheless points out that his career could have made him one of the richest men in America if wealth had been his motivation. But it was not, and never has been. He regards himself as a creator, like the inventor, the philosopher, the musician.

The General's particular creative genius is an ability to understand the abstract language of science and to translate it into devices that will benefit mankind. Understanding the nature of wireless communication, he foresaw the instruments that made radio and television universal and marshaled the scientific forces necessary to make these dreams come true, as well as the manufacturing organizations equally necessary to make them available on the marketplace. When the atom's

secrets were unlocked and the doors to space were swung ajar, Sarnoff again was able to project these scientific discoveries into satellites and space exploration.

Now that the color television he pioneered has come into its own, the General's company is already in space. It was designer and developer of the Federal government's Tiros weather satellite, and chief contractor for communications satellite, Project Relay. On earth, Sarnoff has large dreams for linking every human being to every other with personal sight-and-sound.

The dreamer of these dreams has a right to be heard when he talks about the future. His record is illuminated by a long history of "firsts." Sarnoff proposed radio as a home instrument as early as 1916. Six years later he was arranging the first radio broadcast to a mass audience, the heavyweight championship fight between Jack Dempsey and Georges Carpentier in 1921. He made NBC the nation's first broadcasting network in 1926; and he himself made the first commercial telecast, at the opening of the New York World's Fair in 1939. He pioneered the first commercial color television sets and programs in 1954, and only six years after that he was overseeing the development of Tiros.

Outside the industry he has been an adviser to three Presidents, and performed numerous services for the government. *Time* has called him "one of the most imaginative strategists of the cold war," and leaders in many fields beat a path to his office door. Universities shower

him with honorary degrees, and he could make a public speech every night in the year if he liked. "About the only honor left for General Sarnoff," Dr. Ralph Sockman, the noted New York clergyman, once observed, "is election to the Hall of Fame—and the only reason he hasn't achieved that is the stipulation that candidates must have been deceased for at least 25 years."

Behind all these visible evidences of power and achievement is an extraordinary human being. Physically, he radiates the tremendous energy which makes the careers of most successful men possible. His stocky five-foot-eight frame exudes authority and assurance. He speaks, at least during business hours, in what the Army would call the voice of command, brisk and almost harsh, coloring warmly with enthusiasm when he talks about something near his heart. Angry, he is cold and remote, with an immense, chilling reserve twice as frightening as an explosive fit of temper. His blue eyes are sharp and penetrating. His mind moves twice as quickly as most people's. He is the epitome of confidence.

A man who has been in command for more than a half-century is likely to be somewhat remote from the day-by-day business going on around him, and it is true that Sarnoff lives in a different world. It is a world characterized by plan and order, of which his immaculate desk is a symbol. He deals with one set of problems at a time, and when the papers representing it are no longer needed, they are whisked away and the desk is clear for a new batch. Thus his work never piles up.



MAUREY GARBER

*Sarnoff with an interviewer in his office, 1961*



Where most business managers dictate in a steady stream of letters and memoranda, Sarnoff seldom turns out more than a half-dozen letters in a day. The office rule is that memos written to him by subordinates must be no more than a page long, but he expresses freely whatever he has on his own mind, even if it takes 30 pages to do it. These memos are not offhand products. The General has collected what he considers the best of his memos and has had them bound in gold-tooled leather.

Disorder is his enemy. "I don't make my mind a wastepaper basket," he says. "Another thing, I don't like to see a lot of agitation around. I want to have things done in a calm, businesslike way. The other night I saw some movie drama or other that had to do with business; you should have seen the businessmen in it—picking up this phone, picking up that phone till the place looked like a madhouse. Why, I think if I had an executive like that working for me up here, I'd fire him."

There are no executives "like that" in the RCA suites nestled together in wall-to-wall carpeted dignity on the 52nd and 53rd floors of the RCA tower. It is a place of almost abnormal quiet, considering that this empire has its own quota of daily crises, like any other business. Everyone, even those who have never seen him, is conscious of the man on the 53rd floor who hates disorder.

Power may be the keynote of Sarnoff's personality, but power itself has never been the end in view. The

General has spent his life surmounting obstacles, from his earliest days. Sometimes the struggle has been the result of hard necessity, but more often it has been the natural habit of a man who enjoys taking on difficult problems and ideas. He is not particularly interested in money as money, or power as power. What interests him is everlastingly pushing hard at the barriers that separate men from what they want to achieve, whether it is the creation of a business enterprise or a new harnessing of natural forces.

If there is a common denominator among successful men, it is their total absorption in work to the exclusion of nearly everything else, and this is true of Sarnoff. His hobbies are music, reading, and boating; he doesn't play golf, and in fact has no time for games of any variety. Even at home it is not unusual for him to come in at midnight and work half the night.

He is constantly in touch with his communications empire, no matter where he may be. In the private barbershop on the top floor of his home—being barbered is one of his few relaxations—there is a radio and telephone beside the chair, as there is in the barbershop adjoining his office, which is reached through a concealed door in the oak paneling. His air-conditioned Cadillac, in which his chauffeur transports him about the city, has a radiotelephone set through which he can communicate with nearly any point in the civilized world.

There is a television set in his office, as there is in the office of every other RCA executive, and when he

goes to lunch in his private dining room on the floor below, down a private stairway, he has available a really impressive link to the world. A drawer in the dining table at his place contains a complicated control panel of buttons, switches, and dials. Manipulated by the General, it first agitates an innocuous looking oil painting depicting a pastoral scene of rural delights beside a waterfall, opposite his place, and causes this tranquility to slide down inside its gilt frame, disclosing a television screen of formidable proportions. The General is then able to dial any program he wants to see, including those being rehearsed in NBC's studios. He takes a paternal pride in this gadget and allows an occasional visitor to operate it.

But it is no tycoon's toy. Sarnoff could explain, to anyone who asked, exactly how the whole thing works. His understanding of complex electronic systems even now amazes some of those who work for him, particularly those who know that he had virtually no formal training in this field. Yet he understands and deals with the most difficult problems in electronics, and is well able to explain them to other people.

The electron, the earliest discovered of the smallest particles of matter, came into man's consciousness about the time Sarnoff was born, as he is fond of noting, and its uses have been the substance of the General's life. How its awesome properties have woven together the separate parts of his life are dramatically illustrated by two devices in his office. There, in a glass case, is mounted



RCA

*Sarnoff using the telegraph key on his desk*

the wireless key that the 19-year-old Sarnoff operated for 72 historic hours when the liner *Titanic* sank in 1912, an episode that was a major turning point in his life. In a desk drawer is a silver-plated telegraph key that the director of the RCA empire could use, if he chose, to put himself in instant contact with the radio stations and studios he controls.

In reality, of course, he would be unlikely to do so. The key is a symbol. To perform the business of conducting RCA's worldwide organization, Sarnoff has developed one of the most efficient managerial systems in American business, born of the passion for such efficiency which controls his own activities. "I don't want to do what someone else can do," he says, and so confines himself largely to policy matters when he sits at his clean and massive desk. Like any first-class executive, he knows how to delegate authority. Papers flow from his desk marked "PSM," for "Please see me," or "Pls handle," or often merely a succinct "Yes!" or "No!" Speeches are a different matter. He works on them himself, sometimes through a dozen or more drafts, before he scrawls "*stet*" (the printer's mark meaning "let it stand") across the first page. This mark usually does not go on a speech until he has tried it out on his wife Lizette at home.

Business as business is only one aspect of the General's life, but it is something for which he has demonstrated remarkable talent. When he became president of RCA in 1930, there were few who envied him. The

radio industry had been struck a staggering blow by the Depression, and RCA's income had plummeted from \$182,000,000 in 1929 to a slim \$62,000,000 by 1933. In addition, a government antitrust action concerning the Company was settled in 1932, as a result of which General Electric and Westinghouse agreed to dispose of their stock interests in RCA.

Another man coming into the presidency at so precarious a time might have trimmed sail and considered himself lucky to ride out the storm. Not Sarnoff. Boldly he pushed ahead with expensive and expansive research programs. Meanwhile, he steered the corporation so skillfully that it paid its first dividend in 1937, and since that time has never shown a deficit. Today it is the 25th largest company in America.

A recent example of the indomitable Sarnoff at work was the fight over color television, which came to a climax in 1950. When this struggle began, RCA went into the battle with considerable reluctance. It had been developing its own system, one which would operate in the standard black-and-white channels and would therefore be "compatible," meaning that the color picture could also be received in black-and-white by those who did not have color sets, a highly important element in building an audience. The Columbia Broadcasting System, on the other hand, was ready to demonstrate a non-compatible system.

Sarnoff wanted to wait for a test between these systems until his own was thoroughly tested, but the Federal

Communications Commission was anxious to approve standards for the industry so that the new development in television would become commercially feasible as soon as possible. Knowing that the Commission did not intend to wait, Sarnoff ordered the research placed on a crash basis, and in April 1950 he took a characteristic gamble by demonstrating the RCA system before the FCC, hoping he could convince them to wait, if not actually to approve the compatible technique.

His doubts and anxieties proved to be correct. There was nothing wrong with the basic system; it is the same one employed in all color sets today. In 1950, however, it was not ready. Sarnoff summarized his demonstration wryly: "The monkeys were green, the bananas were blue, and everyone had a good laugh." Soon after, the FCC approved CBS's non-compatible system, which was producing a good picture.

The disadvantages in producing such a color set were nevertheless so obvious that CBS wisely decided not to take advantage of the decision and try to market its system. Then the Korean War curtailed research and development sharply, thus postponing a final decision. While the war went on, Sarnoff went ahead quietly with all the facilities available to him, pushing his research men to iron out the wrinkles in the compatible system. When the war was over, the FCC reversed itself and set up new color standards recommended to it by a committee from the whole industry. No one was astonished that these new standards were substantially those

Sarnoff had advocated from the beginning of the controversy.

The General is a bold and persevering fighter for whatever he advocates, and it is characteristic of his pioneering efforts that he has never hesitated to spend his company's money if he believed that whatever he was doing with it would pay off eventually. In the Depression, for example, justifying his undiminished research program, he declared that troubled times called for "brave dollars" as well as brave men. In developing black-and-white television, he poured out \$50,000,000 before the new medium earned back a penny, and he spent nearly three times that much on color. Presently he has staked a fortune on the development of computers, forthrightly entering a field already dominated by International Business Machines, and he is pushing to circle the globe with color television by satellite. "The future has always interested me more than the past," the General remarks succinctly.

The Sarnoff that the world and his business associates see is a dominant, determined man, vigorous and commanding, superbly talented in a half-dozen directions and intensely involved with the whole immense empire he controls. *Fortune*, the magazine of business, has summarized him: "He is a whole cast of characters—the dramatis personae of a long play about success in American business. He is at once a farsighted leader and a volatile boss; a charmer and a hardboiled taskmaster; a philosopher ('competition brings out the best



in products and the worst in men') but withal a fearful competitor himself. . . ."

There is, quite naturally, another Sarnoff, one seen in off guard moments during the business day and by his wife and his few intimates at home. A man of the General's particular personality does not easily inspire anecdotes, and there are few to be heard in the RCA tower, but those that exist are revealing.

John B. Kennedy, the radio commentator, recalled several years ago a day in Atlantic City when Sarnoff and his late brother Irving, a man who was prominent in the New York radio retailing business, were talking with a group of radio dealers. The General, his cigar cocked at a militant angle, was needling his younger brother in the manner of older brothers everywhere in the world.

"Quit riding me," Irving said, with mock anger. "You quit riding me or I'll tell mother."

Sarnoff walked away smiling, sharing Irving's quiet enjoyment of the fact that their capable mother had dominated all four of the Sarnoff boys.

The General relaxes most, perhaps, with music and musicians. Next to science and business, they are his nearest and dearest interests. His closest friends, aside from Baruch, the late Albert Lasker, and the late Herbert Bayard Swope (a trio once referred to as Sarnoff's "kitchen cabinet") have been musicians. One is Samuel Chotzinoff, music director of NBC and the man who made the NBC Opera Company a national television

institution. Another is the violin virtuoso Jascha Heifetz. The pianist Artur Rubinstein is still another.

When he was alive, Maestro Arturo Toscanini became one of Sarnoff's good friends, a relationship surprising to some people who could not understand what these utterly different men had in common. They had, of course, the NBC Symphony, still active today as the Symphony of the Air, a first-rank orchestra that Sarnoff had especially created for the distinguished conductor. That would have been enough in itself, perhaps, but the two men had a shared interest in what was going on in the world, as well as in the special world of music. Sarnoff introduced the Maestro to television, which he had avoided, and was delighted when Toscanini became an avid sports follower, particularly of the fights. If the Sarnoffs—or anyone else—came to dinner on a fight night, dinner had to be early and over with before the slugging began.

Once, however, the relationship was unexpectedly strained when the Sarnoffs entertained by giving a surprise party for Toscanini. It was a surprise, but to the temperamental maestro, not entertaining. Shown up to the sixth floor of Sarnoff's house when he arrived, he was disconcerted when he was asked whether he had a reservation, and further disturbed to be ushered into an upstairs room that had been turned into a nightclub for the occasion. Jazz greeted his affronted ears, and he could scarcely believe it when he saw his friend Sarnoff dressed as a ringmaster introducing circus acts, in

which the General's celebrated friends were the stars. Astounded and horrified, Toscanini watched Heifetz's sister Elza, the wife of playwright S. N. Behrman, riding a make-believe horse. Then he put his head in his hands and would look at the show no more.

The General and his friends were not discouraged. They went on to other imaginative parties, at one of which, on Sarnoff's birthday, Chotzinoff impersonated him in a most un-Sarnofflike fashion, sitting at a breakfast table and talking into a half-dozen telephones at once while he beat the table with his fist and chewed cigars. Unlike Toscanini, Sarnoff was delighted.

Alone in his 30-room house on East Seventy-first Street with Lizette; the General comes as close to the rest of humanity as a man with his background and in his position can come. It is not, obviously, the kind of dwelling most men could call home, with its six floors, two patios, barbershop, projection room, and a profusion of television and radio sets, but in it the General leads a life as near to normal as possible.

He has, as his wife explains, "his crotchets." For one thing, he hates to tip—not out of any penuriousness but simply because the act of tipping embarrasses him as a human transaction. Consequently he will leave his hat in the car rather than check it; and when he eats out, it is usually at a restaurant on a small, select list. The people who serve him in these places are tipped once a year by check, along with his barber and manicurist. Their wait is compensated by Sarnoff's generosity.

Through this system he believes that he is maintaining some sense of dignity between the server and the served.

Years ago he was persuaded to give up driving, a change accomplished when he had a mobile radiotelephone installed in his car. In his driving days it was always a contest between driver and machine. "I used to sit beside him, uncomfortable," his wife has recalled, "wondering whether I ought to tell the master of the electronic age that I did not like the way he took the last corner."

At home he ranges over the six floors of the house, from a small study on the first to his own office on the fourth (the entire fourth floor is his personal domain) to the sixth, where there is a solarium and a terrace—and the barbershop. Sunday morning in the barbershop is a Sarnoff institution. His friend Sam the Barber, who has shaved him for nearly 20 years, ministers not only to him but usually to three or four old friends who drop in. Afterward the men eat brunch together and spend the afternoon talking.

Sometimes the house seems more like a laboratory than a home to his wife, when she contemplates the electronic devices that decorate it from top to bottom. There may be as many as 20 television sets scattered through the house at one time, nearly all of them experimental models in various stages of development. They are constantly replaced as new developments come along. "I just about learn to work one when it's gone," Mrs. Sarnoff complains gently.

The General's study desk is equipped with a battery of buttons that control the room lights, operate the radio, and make a painting disappear in favor of a television screen, as in his RCA dining room. A similar panel is built into a corner of his bed. Sarnoff thinks it is silly to do anything by hand that electricity can do. There is, in fact, a professional panel room that controls the entire intricate system of radio and television throughout the house, but not including the fully equipped sound-movie projection room in the library. The drawing room, which is decorated with Chinese murals, is large enough to hold a small concert audience, and often does.

Aside from the barbershop, Sarnoff's favorite room is his fourth-floor office, which is weighted down with a vast collection of ribbons, medals, citations, plaques, trophies, autographed portraits, a small library of press clippings and speeches bound in gold-tooled leather, and 41 volumes of notes for a history of his life and times, which he has said he will not permit to be published until after his death.

In this spacious, somewhat incredible house, Sarnoff has seen his three sons grow up—one of them, Robert, to be chairman of the board of NBC. The growing up process brought the usual quota of juvenile problems to the attention of the man who so much dislikes trivia. Once his youngest son, Tom, fell in love with a white terrier in a Madison Avenue pet shop and yearned to take him home, where no dogs had been permitted

on the theory that they required country fields, not city houses.

Tom wrote to his father: "Dear Dad, I have just seen the most beautiful dog. I would love to have him for my birthday. I could teach him tricks. If you get me the dog, I promise that the first trick I will teach him is to stay out of your way." When the General read this note, he went to the pet shop himself and bought the dog that proved to be the forerunner of other dogs, alligators, birds, and guppies. As a father, Sarnoff drew the line only at a pair of wallabies sent to Tom by an Australian admirer of his father. These animals went to the Central Park Zoo.

Sarnoff has always been a family man, to an extent the schedule of a busy industrialist seldom permits. He loves, for example, to conduct the traditional ceremonies of the Jewish year, most of which celebrate the family in love and gratitude.

As far as the usual problems of humanity are concerned, the General is not exceptional. He tends to be overweight, and his battle against the calories is complicated by his dislike of sports and physical exercise. He has dutifully tried such pleasures as horseback riding in Central Park, but his wife recalls that in his brief riding period he would go to the window, look out with satisfaction on a rainy morning, and remark, "Thank goodness, I don't have to ride today." He has also tried fishing, with an equal lack of enthusiasm for that popular sport.

He does not drink, except for an occasional glass of wine, but his big black cigars are a trademark. When he is not smoking them, in his familiar black holder, he has a pipe in his mouth. He told Winston Churchill, presenting him with a gift of cigars: "The only thing in which I can keep up with you is smoking."

According to his wife, he likes any kind of food "as long as it is fattening," particularly the kind of Old World dishes his mother made, such as pot roast and potato pancakes, loaded with calories. Only his breakfast is Spartan—a slice of toast and a little fruit. He would like more, but Mrs. Sarnoff, guarding his weight, prevents it unless the servants sneak him a roll, to which he may add a little jelly he steals himself. "When we are riding to the theatre, or to a friend's house," his wife says, "he will often ask, 'Do you have any candy?' I keep hard candies for him in a box in my purse."

His love for gadgets is like a small boy's. He has every possible kind of pocket tool, and a basement workshop full of larger items. His drawers are full of pens, pencils, and similar everyday working equipment, from which he chooses in the morning as he does his ties. RCA built a special transistor radio for him that he carries in his vest pocket. The set is equipped with earphones so that he can listen to a program even during a waiting period at a public banquet. At one such affair he jokingly remarked to a lady guest that he used the earphones only when he was bored by a dinner companion, then absently plugged them in a little later

before he noticed that the same lady was seated next to him. His agile brain produced a saving response. Turning over the earphones and set to the lady, he remarked, "It's yours—if you're bored by me, you can use this."

No one is known to be bored with Sarnoff's conversation. At the beach, at home, anywhere, he will talk about science, or the arts, or industry, or communications, to anyone who will listen. His wife has often seen him at the beach in a pair of swimming trunks, talking at first to a stranger but soon surrounded by a circle of other people who sit entranced while he talks and answers questions—usually about developments of the future.

At home he enjoys equally talking at the small dinner parties his wife arranges to provide him with intellectual stimulation. He hates to go out. "He would rather eat two soft-boiled eggs at his own table than go to any restaurant," Mrs. Sarnoff says. But with congenial guests in his own house, he relaxes completely and speaks with the energy, enthusiasm, and charm his friends know so well. He likes to talk about foreign affairs, politics, economics, and such subjects, but always the conversation turns in time to science, electronics—and the future. Then, as his wife says, "We are all sitting on the edges of our chairs, looking with him into the unknown."

A day in the life of Sarnoff begins at seven-thirty when a masseur comes to his house and gives him a massage before breakfast. He and his wife do not breakfast



together—he eats alone downstairs; she has hers in her room—but even at this early hour he is the communications expert in action, sending up clippings from the morning paper for her to see, reading messages she sends down to him. Before he leaves the house, Mrs. Sarnoff comes down, examines his necktie, and kisses him good-bye, like any suburban housewife.

Then, during the day, he is the man behind the desk in the RCA tower, smoking his cigars, dealing methodically with one problem at a time, sometimes thinking and planning by himself with his head in the stars.

At six he comes home from the office, and his first words are invariably, "Is Mrs. Sarnoff home?" He never fails to telephone if he is going to be late, a virtue most wives would particularly admire. As soon as he is home, the General goes to bed and sleeps soundly for about an hour and a half until dinner is ready. If he is particularly tired and sleeps longer, Mrs. Sarnoff lets the servants go and gets dinner herself, which she did for years before the family had servants.

The house runs according to his schedule, and he is never made to accomodate himself. When his wife senses that he has worked too hard and needs rest, a conclusion she comes to by wifely radar, she tactfully cancels whatever has been planned for the evening. One certain sign of overexertion is his appetite; he eats more when he is under great pressure or has particularly difficult problems. But he snaps back quickly, sometimes with no more help than a 15-minute nap.

Sarnoff is not a man who runs by the clock. When he comes home as late as one o'clock, he may feel like working in his office. If his wife is tempted to behave like a wife and urge him to go to bed, she restrains herself. "Who knows what new idea or new development is taking shape in his mind?" she says. "Do I want to go down in history as the woman who kept some important scientific advance from taking place because she was sleepy?" Consequently she sits up with him, reading while he works, listening if he produces a new idea he wants to talk about.

On occasion, at three in the morning, he has been known to say suddenly, "Let's clean out." Mrs. Sarnoff knows what that means. It happens three or four times a year. They go through his suits, socks, shirts, and ties and make a pile to give away. Cleaning out is about as close as the General comes to a hobby. But he finds it difficult to give away shoes, which are one of his special enthusiasms. Otherwise, he is undemanding about clothes. Mrs. Sarnoff helps him pick out his suits and prevents him from buying the same ones—plain blue, or gray, or brown.

Giving away clothes is the smallest part of his charities. Not only does he contribute to the usual public funds, but he is the kind of philanthropist who unobtrusively sends young students through college and gives money to revolving loan funds at schools. He is a trustee of several colleges and universities, including such institutions as Pratt Institute, and the Educational

Alliance, where he first went to school. Nor is his only philanthropy in education and the funds. Old friends from the lower East Side have known his benefactions with gratitude, and the East Side itself has seen him on occasion, when he returns to the old neighborhood, sees the familiar scenes once more, and talks with the few onetime cronies who remain.

All these facets of personality are his points of contact with the everyday world. The inner world of dreams and plans, in which he has spent so much productive time, shows itself in odd ways. One is his dislike of being interrupted, which a casual observer might put down to ego, but which in reality derives from Sarnoff's respect for orderly thinking. He himself never interrupts anyone. But whether talking or listening, those closest to him are aware of his ability to shift his mental gears and transport himself to the inner world, where he only appears to be listening, and where his conversation is mechanically responsive. His wife has seen him talking on the telephone for nearly an hour, listening to the man at the other end without a word while he is busy with his own thoughts.

Who is the real Sarnoff? one might ask. Is it the figure of command in the RCA office who says briskly when someone asks him which part of the corporation is his favorite, "The one that's in trouble. If things are going all right, they don't hear anything from me"? Or is it the quiet man at home in his "upstairs office," in the house where he has lived for more than three decades, looking

up now and then at the inscribed portraits of Presidents Roosevelt, Truman, and Eisenhower on the wall, or the bronze plaque of Marconi, or the musical birthday tribute from Toscanini, or the bookshelves packed with autographed first editions, or "the hardware you collect in the course of a lifetime," as he refers to his citations, plaques, trophies, ribbons, and medals—or, most fondly, the World War II pictures of his three sons in uniform, and his wife in the uniform of a Red Cross nurses' aide? Often he opens the albums that record the lives of the eight Sarnoff grandchildren from cradle to college.

The real Sarnoff is all these men and more. He is the true product of the exciting times that have made him, and of a life that is an incredible story from beginning to end, one that could have happened only in America.



## Chapter 2

# A Boy Comes to America

No career ever began under less auspicious circumstances than David Sarnoff's. When he was born, on February 27, 1891, he was about as far from a position of power and influence in the world as an infant could be, both geographically and economically. His birthplace was a bleak village named Uzlian, on the steppes of southern Russia, and his family were desperately poor.

In the little town, where no more than 200 people lived, there were no upper and lower classes, only degrees of poverty. Most of the villagers were Jews, whose houses were small wooden shacks and whose food came principally from the scraggly gardens behind these dwellings. Money was scarcely known in this remote region, which was several hours away from the nearest city, Minsk.

Trading had replaced the usual commercial life in Uzlian's primitive society, and most of the townsmen, like David's father, were traders. They went about among the neighboring peasants on the steppes, bartering shoes, clothing, and similar necessities for produce and, if they were lucky, livestock. It was a precarious life. The struggle was to stay alive, to get a minimum of food and clothing. Most hoped for nothing more.

David's father, Abraham, was different. Like the others, he heard the travelers' tales about America that reached even this isolated spot, but he did not sigh and consign the Land of Promise to the realm of impossible dreams. Instead, he began to plan how he might achieve what must have seemed virtually impossible—to transport himself and his family from the lonely, hopeless village to the glories and riches of New York.

By the time David was four years old, his father had made his decision. He would sell all his trader's stock, leave enough to keep the family alive for a time, and buy a steerage ticket to America with the remainder. In its own way, it was as bold a gamble as his son would take many years later in the world of high corporation finance.

The parting was agonizing, and it would not have been surprising if some village tongues wagged about this man Sarnoff who would leave his family and go off to America by himself. No one could be certain if he would even get there, much less be able to earn

enough in a strange country to keep on supporting the family and save the sum required to bring them over. But the mother was brave and willing to take the chance, although she would be left with David, another son even younger, and a third still unborn.

The family parted with tears and promises. David's mother, who was the descendant of a long line of rabbis, decided soon after that she could make her own hard life alone more tolerable and at the same time fulfill the dream she had for her son by sending him to his granduncle, a rabbi who ministered to a settlement even smaller than Uzlian, a village called Korme, where the good rabbi's flock numbered only 12 families.

When David was five, his mother knew it was time for him to go to Korme. By now her husband's letters, bravely optimistic but more than ever vague about when he could send for his family, had convinced her that life in the New World had not proved to be the quick road to fortune they had dreamed of. The elder Sarnoff was working and saving, but life in New York was as hard as it had been at home. It would take time. Meanwhile, the mother reasoned, David was the proper age to begin his training as a rabbi, and the granduncle was the proper person; in spite of his humble station, he was known to be deeply versed in the Jewish religion.

Now there were more tears as the mother kissed her firstborn goodbye. There would be one less mouth to feed, but it was a mouth and a son she could hardly bear to send on such a long journey. Korme was some



500 miles away. Only her proud hope that he would one day be a rabbi made the parting less intolerable.

As for David, he was already homesick but nevertheless excited by this first great adventure of his life. The excitement was enough to sustain him while he traveled by train from Minsk to the railway station nearest Korme. But then he was tumbled into what the operators were pleased to call a "stage," which was no more than a rough country cart, its bottom covered with a thin layer of straw. On this David and a few other hardy travelers huddled together while the cart creaked and bounced over roads that were scarcely passable, 200 miles through a dreary, rolling plains country until it stopped at last at the village of Korme, clinging to a hillside.

Here was a desolation he had not known even in Uzlian. At least he had enjoyed a few playmates in his native village, but in Korme he was the only child in the settlement. His granduncle was a kind man, but stern and severely orthodox; if David was going to be a rabbi, his granduncle meant to have no nonsense about it. The boy would have to learn 2,000 words of the Talmud, a book of Jewish traditions, every day, as well as sit for his regular religious lessons. So began a harsh regime that lasted nearly four years. David rose at dawn and began his Talmudic studies at seven. They went on all day, with time out only for meals, until eight o'clock at night. He had no playmates, no recreation, no relief from grinding study.

How welcome the news must have been, between his ninth and tenth birthdays, when his mother wrote and told him to come home. Abraham Sarnoff had at last sent them the money to come to America. They would leave as soon as David arrived. He departed from Korme without tears.

It was arranged that he would join his mother and his two brothers in Minsk, where they would all take the train to Libau, Latvia, the first port of embarkation. "The hour that followed our reunion in Minsk," Sarnoff wrote years later, "is etched in my memory so deeply that I shall never forget one detail. We were waiting until it was time to board the train for Libau when we noticed that a tremendous crowd had collected in the principal street. One of the sporadic Russian revolutions was brewing.

"As we watched the surging people, a company of mounted Cossacks came charging down. They called on the crowd to disperse. No one moved. The Cossack leader barked a word of command—and the whole company rode into the wailing mob, lashing out with their long whips and trampling women and children under the hooves of their horses. The sight sickened me and I clung to my mother's skirts."

His departure from the Old World could not have been more symbolic, nor could the promise of the New World have seemed more bright.

"A day later," Sarnoff continued, "we were on the boat, the first I had ever seen. I marveled at its move-

ment as it swept out of the harbor, and all the rest of the day and long after the stars came out at night, I watched the receding shore line and the other vessels coming and going."

After a short voyage, the Sarnoffs found themselves in the noisy confusion of the docks at Liverpool, England, where they were to take another ship, which loomed up awesomely large to the small boy. As the little family clung together on a corner near the pier, waiting to board, a trolley car clanged down the street—another first sight for them. "To me it seemed moving without any kind of propelling force," Sarnoff recalled, "and I was sure that everyone in America must travel about in that fashion. I suppose we were as strange a sight to other people as the trolley was to me. In Russia it is still cold in early June, and we were wearing the fur caps and clothing that were a suitable enough garb when we left home."

They were no more than safely aboard the steamer, as steerage passengers bound for Montreal, when David had the greatest fright of his life. His mother had brought along two large bundles, one holding the feather ticks that had been stretched on the family's board pallets at home, the other containing food enough for the whole trip. The feather ticks were the result of a mistaken notion that they could not be replaced in America, but the food—bread, cake, and pickled meats—was absolutely essential because it was kosher. David's mother had warned the boys that if anything

happened to that food, the family would not be able to eat at all. With his religious training still fresh in his mind, David knew his mother would starve rather than touch the regular steerage fare, and he himself would have accepted the same fate without questioning.

His horror is easy to imagine, then, when he saw the ticks and the straw hamper of food disappearing with a heap of baggage being lowered into the hold. A vision of starvation flashed before him, and instinctively he ran forward, leaped wildly, and plunged down into the hold after the food hamper. It was a sheer drop of 50 feet to the bottom. Fortunately, he landed on some soft bundles that broke his fall.

"Crawling around until I had found the hamper," he remembered later, "I clutched it with a death grip. Meanwhile, I could hear far-off wails from above. Mother and the other women nearby were sure that I was killed. Finally a seaman appeared, knotted a rope around my waist, and I was hoisted up like a sack of meal. I reached daylight again, holding for dear life to the basket of food."

One of the sailors watched this scene with amusement and admiration. "You'll get along all right in America," he assured David, in Russian, making one of the most conservative prophecies of the century.

The boat was small and slow, and it was nearly a month before it deposited them in Montreal. There the family took the train again, to Albany, where they boarded the night boat for New York and landed on a

sultry July morning in the fabled metropolis. The year was 1900.

"I had my first look at my adopted country from the deck of a Hudson River steamer," Sarnoff recalls. "Manhattan's skyscrapers, including the fabulous 29-story Park Row Building, then the tallest office structure in the world, sparkled in the morning sun. The harbor was crammed with shipping. The people on the pier looked happy, purposeful, prosperous. 'Here, indeed,' I thought, 'is the land of promise.' Two days later I was peddling papers on the streets of this land of promise to help support my family, but I was full of hope. I was unable to speak or understand a word of English, but I was in a new world, a new society, among a new people."

At the pier there occurred one of those mixups common among immigrants and their families in those days. As the Sarnoffs anxiously scanned the dock for the first sight of father Abraham, whom they had not seen for six long years, and whom the youngest boy had never seen at all, they could not find his familiar, bearded face among the people milling about in the confusion of the pier. He had gone to the wrong pier to wait for them.

Bewildered and alone in the clanging swirl of New York traffic, terrified by the crowds and the noise and the overwhelming impact of the city, the mother appealed to a policeman, who found an interpreter and straightened matters out. They were sent to a small

boardinghouse, where Abraham soon found them and the family was tearfully and thankfully reunited.

David's mother must have had a cruel shock when she saw her husband again. The bitter struggle to keep himself alive, send money home, and still save enough to bring his family to America had been successful, but it had shattered his health. The asthma that had troubled him for years was now chronic, and it was aggravated by his trade of house painting. It would be only a few months before he would have to take to his bed and live out the remaining years of his life as an invalid.

Meanwhile, established in the new home, a small tenement flat in the Lower East Side ghetto, David wasted no time getting a job to help support the family. He had, in fact, two jobs. No more than a day or two after his arrival he was working for \$1.50 a week as a butcher's delivery boy and soon he had a paper route in the bargain.

It was a strange new world he found himself in, unbelievably removed from the monastic quiet and discipline of his granduncle's house and the simple village life of Russia. Life on the Lower East Side seethed and rumbled and groaned, laughed and cried, half in the streets and half in the crowded, hot tenements. There was struggle here, too, of the same kind he had always known. These people were poor immigrants like himself, all seeking their fortunes in the land of promise, and pushing, striving, sweating meanwhile to survive. Pushcarts and sweatshops were the hallmarks of their

aspirations. Saloons and settlement houses were their enjoyments. Yet some of them had already climbed the ladder and gone uptown to live in fine houses. Every day the neighborhood heard of some new success, a boy who had grown up on the fire escapes and in the street jungles, yet had risen to wealth and influence and a comfortable life. Anyone, they believed, could do it.

Young David was totally undismayed by the struggle before him. On the contrary, he was exhilarated by the freedom from everything he had known, which had only stifled him; he welcomed joyously the chance to work in this enchanted new land. Everything he saw and heard only stimulated him the more. Most of all he was excited about the opportunity he had to go to school. There had been no free school in Russia.

That September he entered a school building for the first time in his life. It was the Educational Alliance, on East Broadway, where immigrants were taught the English language, and where he would one day be an honorary trustee.

He had been in school about a week when the teacher told him that he was already proficient enough in the language to recite at the next school assembly. The subject assigned him was, "Cleanliness is next to godliness." Confident until the moment he stood up, poor David found his mind a blank as he faced the tittering audience; he balanced first on one foot then the other. Nothing at all would come, and the teacher had to take him to his seat.

Young Sarnoff never forgot the humiliation of that experience. It made him determined never to repeat it, and as a first step, he joined the school's debating society. Only a year later he was on the same platform, arguing clearly and forcefully the question of the day: "Resolved, that the Philippines be given their independence." It was an early training that helped him further when he became an executive, invited to speak everywhere in the world. In time he became one of the most sought after speakers in America, getting several hundred invitations a year. He wisely accepts fewer than a half-dozen.

School was only a part of David's long day. Every morning he got up at four o'clock to deliver his papers before he started off for class; then after school he was hard at work again as a delivery boy until it was time for evening study. But already a young business man, he was ready to expand in two years, when he was only 11.

A friend had told him about a newsstand for sale at Forty-sixth Street and Tenth Avenue, in the notorious Hell's Kitchen district. The stand was owned by a German who catered to a predominantly Irish clientele in this uptown slum, where crime was the order of the day but people apparently read newspapers, because the stand was profitable. The owner wanted \$200 for his property. David talked it over with some of the family's neighbors, who had marked him as a boy who was likely to go far. When he went among them to bor-



row the money he needed for his stand, he found them not unreluctant to invest and soon he was the owner of his first enterprise.

He had also found another way to supplement his income. Finding himself in possession of a pleasant boy soprano's voice, he hired out to sing in a synagogue choir for \$1.50 a week, and occasionally he appeared as soloist at weddings. Now he had a day's schedule that would make his later calendar as a corporation executive look easy. He was up at four and working with his deliveries until school, then afternoon deliveries after school until it was time for a late supper, after which he traveled by streetcar down to the Lower East Side for choir rehearsals. Sometimes it was after midnight before he got home—and there was still school work that he had to do.

Another boy might have begrudged the time at school and given up his education, but Sarnoff was fascinated by the world of the mind opening up to him. He was learning about the meaning of America, about the wonders of the universe, and his restless, active mind absorbed it all eagerly. He was especially attracted to the story of Abraham Lincoln. Here was a boy like himself, he thought, who started without money, position, or influence but who nevertheless rose to be President. "Lincoln became my inspiration," Sarnoff wrote later. "Evenings after finishing my paper route I would hurry to the public library and borrow one of the books about him. I got to know Lincoln's life better

than most native Americans do. A portrait of him hangs in my office today, and another in my library at home."

It was a profit and loss time for David, these early years in America. The loss was his youth. "At ten most kids are shooting marbles," his brother Irving said later. "David never had time for marbles. All he had was work. He never had a youth." On the other hand, becoming virtually head of a family at 10, with a father too ill to work, he acquired a valuable sense of responsibility that has never left him. It made him acutely aware of responsibility, of assuming and discharging it, and quite naturally it has made him intolerant and impatient of people who will not assume it.

At 15, after six years of this hard-working routine, a minor and a major tragedy compelled him to take a new look at his life. His voice broke on the eve of the high holidays, when he would have made a considerable extra amount of money, thus ending his singing career and reducing his income, which had been no more than enough to support the family. Then his father, gasping for breath, succumbed to the asthma that had crippled him and David knew he would have to give up school and perhaps his part-time employments to look for a full-time job. There were four other children in the family, and his mother could not leave them to work.

"I didn't quite know what I was going to do," Sarnoff said later, "but I was determined that it must be something in which I could shake loose from the environments I had known. I wouldn't be a day laborer,

or a dockhand, or a pushcart merchant, or a stevedore, for example.

"Before even looking for a job, I thought things over carefully. I realized that the people with whom I would have to compete in business could get a normal degree of success with a moderate amount of work. On account of my youth, however, I would have to give at least 50 per cent, perhaps 100 per cent, more effort if I expected to keep pace with them or pass them. In other words, I would have to be about twice as efficient as the other fellow. This situation did not strike me as unfair; I accepted it as a necessary handicap."

The question, however, was what the new job was to be. David had no idea where to look, but he concluded that since the one thing he knew best was selling newspapers, it was logical to go into the newspaper business; and so he went off one Saturday morning to the old New York *Herald* building at Thirty-fifth Street and Broadway to ask for a job. He was neatly dressed, optimistic, and quite unprepared for what followed.

Among the legends built up around the Sarnoff career is that he took the wrong turn in the building that morning and ended at the office of the Postal Telegraph and Commercial Cable Company instead of the *Herald's* reception desk. The truth is that he simply walked over to the first desk he saw on the main floor of the building, which happened to be the desk of Commercial Cable's manager. The company maintained a branch there, primarily for the benefit of the newspaper.

David stood for a moment until the manager looked up, meanwhile listening to the strange chatter of the telegraph equipment. It was a new song but it stirred something in him. The manager lifted his head inquiringly.

"What can I do for you?" he asked.

"I'd like to know where I can apply for a job on the *Herald*," David said.

There was something in the boy's voice and appearance—his neatness, his earnest and confident tone—that made the manager take a second look before he replied, and in that moment impelled him to deprive the *Herald* of an employee.

"How would you like to work here?" he inquired. "We need a messenger. The pay is \$5 a week."

It may have been the money almost in hand, or the tantalizing sound of the key. In any case, David accepted on the spot. He had his first real job, and that day began to reach for the stars.



## Chapter 3

# Learning the Wireless

“**O**ne of my boys is the smartest,” Sarnoff’s mother used to say, “another is the kindest, a third is the handsomest. But David is lucky!”

It was a mother’s fond and half-joking estimate, and there was an element of truth in it that her lucky son was the first to acknowledge. “I have never underrated the element of luck in what passes for worldly success,” he once said. “I know it takes more than luck alone, but I do not hesitate to acknowledge that I have been lucky beyond my deserts. It was luck that my parents had the pioneering instinct and the good sense to bring me to this land of freedom and the opportunity that goes with freedom. It was luck that for me this opportunity materialized in an art and an industry even younger than myself. It was a lucky coincidence that I was born

about the same time the electron was discovered. And it was lucky I hitched my wagon to the electron."

The hitching began on that Saturday morning when the Cable Company acquired a messenger boy and thus diverted a genius who might have flowered in the newspaper business instead. One could say it was also lucky for David Sarnoff, as well as for the millions of people he would later benefit, that the diversion took place, but what happened afterward was far from a matter of luck.

For something was already at work in the mind of this 15-year-old boy. That something was still vague and unclear, but he was aware of an enormous world to be explored and conquered. He did not yet know how he was going to do it, but he knew he wanted to reach out and touch whole areas of knowledge whose existence he only suspected. He wanted to build and plan. What? He did not know that either, but he was restless and he had visions and deep yearnings. He was eager to work, but he was aware that his need was to be in productive, creative work. He was like a young poet or painter, first conscious of his gifts and uncertain what to do with them, but wholly committed to their use.

Meanwhile, there was the Cable Company. The first thing David learned about this enterprise was that a telegraph operator earned more than an office boy. Obviously, then, the next step was to be an operator. He saved \$1.50 out of his first week's salary, bought a telegraph key, and began to learn the Morse code. In most

families it is the piano or violin that brings suffering. In David's, it was his telegraph key. "The noise nearly drove mother out of her mind," according to his brother Irving.

These were long days for David. He had kept his paper route, and got up as always at four in the morning. Then, after a long day at the Cable Company, he practiced the key until he could keep his eyes open no longer. But he was in a buoyant and confident mood. The time was 1906 and the air was full of promise and change, although the panic a year later would dampen enthusiasm briefly. Teddy Roosevelt was in the White House and the trusts were being busted. The muckrakers were at work on magazines and newspapers, exposing the unholy alliance between the new industrialists and the politicians.

At the moment, however, horsecars transported passengers nearly everywhere in New York, a schooner of beer cost a nickel, and a free lunch at the bar was thrown in. Gaslight flickered in houses everywhere, and a frightening gadget people called the horseless carriage snorted in the streets.

"I was only 15 years old," Sarnoff recalls, "and life for me was like a blank page—challenging and a bit frightening in its clean white emptiness."

For the first six months he was busy delivering messages and trying to learn the code. Besides practicing at home, an aspiring messenger who wanted to learn Samuel F. B. Morse's revolutionary symbols could help



himself by paying attention in the office when there were no messages to be delivered and listening to the key as the mysterious dots and dashes poured through it. David added a third element to the learning process. Having made friends with the manager from the day he went to work, he persuaded the older man to let him practice on the office instrument when there was nothing important coming over.

While he was engaged in this practicing, young Sarnoff, in the manner of telegraph operators everywhere, carried on long conversations with a man in the main offices of the company, a man he never saw. To this unseen correspondent David confided his ambition to be an operator, and one day he was rewarded when his friend told him he had heard the Marconi Company had a vacancy and advised him to apply.

At the first opportunity, Sarnoff presented himself in the headquarters of the Marconi Wireless and Telegraph Company. The man who confronted him was George S. De Sousa, the company's traffic manager, who also did the hiring.

"Could you use a man?" David asked forthrightly. "I hear you have an opening."

De Sousa looked him up and down, no doubt with some amazement. Then he addressed the applicant, who looked hardly old enough to be an office boy, in his most dignified manner.

"How old are you and what experience have you had?" De Sousa inquired.

Sarnoff told him the truth, and meanwhile a twinkle appeared in the De Sousa eye.

"I'm sorry to say we can't use a man," the manager said, when David had finished. "That job has been filled, but we *do* need a boy, an office boy, at \$5.50 a week."

For a moment disappointment overwhelmed David. It was only 50 cents a week more and essentially the same job he had left, but it would be with a wireless company and the opportunity to learn more was there. He and De Sousa eyed each other while the boy hesitated, and decided they liked each other.

"I'll take it," David said.

At that moment the Marconi company was a struggling organization specializing in marine communications, with four land stations at Sea Gate, Coney Island; Sagaponack, Long Island; Siasconset, on Nantucket Island; and South Wellfleet, Massachusetts. It had only four ships with which to communicate, and it was losing money steadily.

Of this situation the new office boy knew very little at the start, but he was not long in learning. "I hated being an office boy," he said years afterward. "But because I hated it, I devised ways to make my work more interesting. One way was to read every letter I filed. My bosses didn't object, because in that way I always knew exactly where to lay my hands on any correspondence they called for. As for myself, I gained a practical education in the operation of a wireless-

telegraph business. In fact, I soon became more familiar with the details of the company's work than anybody else around.

"I also took advantage of the opportunity to improve my knowledge of English. I carried a pocket dictionary, and whenever I encountered an unfamiliar word I made it a point to look it up. There was a thrill of discovery in every fresh word I learned. The president of the Marconi Company at that time was John W. Griggs, a master of forceful prose. He had been a governor of the State of New Jersey, and an attorney general of the United States. I studied his letters with special interest and tried to imitate his style."

Always, David was learning. He borrowed books on electricity, thick technical volumes, and studied them on his way to and from work. Often, worn out by the day's labor, evening study, and practice with the key, he would fall asleep in a chair and spend the night there.

At the office he soon made another discovery which added substantially to his self-acquired education. The company, he learned, was operating a small experimental shop on Front Street, where H. J. Round, leading expert of the British Marconi Company, was busy developing new transmission methods. The boy and the expert became friends, and David began to spend his Saturday afternoons and Sundays in the shop. Round was more than happy to exchange information and explanations about what he was doing for odd jobs done and other assistance given. For a boy of Sarnoff's back-

ground, it was no sacrifice to give up his day-and-a-half off.

"There were a good many executives in the office," he once explained, "but I felt no aspirations toward their jobs—at least, not through any routine office advancement. It seemed to me that the operators out in the coastal stations, and Jimmy Round down in his little shop, were nearer to the heart of radio than the men who sat in swivel chairs and gave directions. I felt that the important individual of the future would be the man who knew all about radio from practical experience. I resolved solemnly that I would become such a man."

Sarnoff was already convinced that wireless was the important invention of the day, and its development a key to unknown marvels in the future. He was determined to be in on the ground floor. In the office and the laboratory he listened breathlessly to the tales spun by wireless operators from ships who visited the office from time to time, and he read everything he could about Morse, Edison, and the scanty history of wireless.

Then came a break his mother would have called lucky. The company was asked to send two operators to an electrical show to be held for several weeks in Louisville, Kentucky. The idea was to set up wireless stations at each end of an armory and dispatch messages between them. Knowing that the company was short of operators, Sarnoff pleaded to be sent as assistant to an experienced man. Round and the others who knew about his studies

and outside work put in a good word for him, and he was finally given permission to go.

The trip was another new experience—his first ride in a Pullman and his first taste of hotel living—but it proved to be much more valuable in a practical sense. The competence he displayed at the Louisville show was proof enough for the Marconi officials that he was well able to handle a key of his own. When he returned to New York, he was put in charge of the line connecting the main office with the Sea Gate Station, then the busiest point in the circuit. The long nights of study and practice had paid off. David was an operator. In time he became one of the fastest operators in the business, with a “fist,” as it was known in the trade, capable of sending 45 words a minute, hour after hour.

Sarnoff not only worked for the Marconi Company, but he came to know Marconi himself, the already legendary figure of wireless, who had long been his hero. He had first seen the Italian scientist on a day when Marconi, on one of his trips to America, had called at the Marconi Company's office. The visit was a double piece of luck, so the story goes, because Marconi's visit came not only when David was in the office instead of delivering messages, but at the end of the day, when the scientist's departure coincided with his own. Fascinated by the mere presence of his hero, Sarnoff followed him through traffic to the Marconi Company's Front Street laboratory, where David himself would soon be working.

To many Americans, Marconi was still a somewhat unbelievable figure, a wizard who took lightning from the sky, as Franklin had done, and then made it perform for him. He had burst upon the American consciousness only a year after David had come to America. The papers had reported how the slim, intense Italian had stood on a hill in St. John's, Newfoundland, on a December day, 1901, flying a kite which carried his aerial, and from which he plucked wireless code signals from Poldhu, on the coast of Cornwall, transmitted on electrical waves in the atmosphere.

David had read about this incident, and indeed about every other aspect of the inventor's life that had appeared in print. He was overwhelmed when, as an employee of the company, he was introduced to Marconi, who took a liking to him at once. It may have begun as vanity on Marconi's part, a response to the obvious adoration of a young boy who dedicated himself to doing anything the inventor required when he came on a visit—running errands, begging to do chores, even delivering flowers to the ladies Marconi knew in New York. But then it became something more, and the two men were friends. The time was not distant when they could meet almost as equals; and when David Sarnoff had done more, perhaps, to utilize Marconi's discoveries for the benefit of the world than any other human being.

To David it was one of the most satisfying friendships he would ever experience. "I know what my asso-

ciation with Marconi meant to me when I was young," he once said. "I remember how patiently he explained to me the theory of the propagation of electromagnetic waves in space. 'David,' he said, 'we know *how* things work. We don't know *why* they work.' " That, to the young Sarnoff, was the fascinating part of the whole business—the search for the *why* of things, the ultimate truth. It became the search to which he dedicated his life.

As a full-fledged Marconi operator, Sarnoff now had the opportunity to get out of the office and serve wherever an operator was needed. Among his first assignments was on the steamship *New York* of the American Line, sailing from New York to Southampton; he was the only operator aboard.

As the ship moved out of New York harbor into the Atlantic, Sarnoff could not help thinking with wonder and gratitude of what opportunities the New World had already given him. It had been only nine years since he had first crossed the Atlantic, a poverty-stricken steerage passenger, with no visible prospects.

"So there I was," he has remarked, "nine years after arriving in this country, serving as the Marconi wireless operator on a first-class passenger liner, with a first-class cabin all to myself, with a uniform and gold braid, classified as a ship's officer, messing with the captain and the other officers, and entertaining and being entertained by the first-class passengers. No other country in the world, I thought, could have done such a thing for me."

At 17, Sarnoff was already a competent operator, but he wanted to know more, to do more, and when he heard that the Marconi Company needed an operator at its lonely Siasconset station, on the coast of Nantucket Island, he asked for the job. The Marconi officials hesitated. They were reluctant to send a boy so young and with so little experience to such a responsible position, but on the other hand it was difficult to induce an experienced operator to take this isolated post. Expediency won, and young David got the job.

"The principal reason I wanted the job was because of the fine technical library the company maintained there," Sarnoff admitted later. "My salary was \$60 a month, certainly a modest sum, but I stood a watch only eight hours a day and was able to spend another eight hours studying."

After a few months on the island, Sarnoff could send and receive messages as rapidly and skillfully as any man on the coast, and he was rewarded for his proficiency by a raise to \$70 a month. Of this he sent \$40 home to his mother, and another \$25 went for board at a nearby farmhouse.

His progress might have been satisfying to someone else, but Sarnoff was not satisfied. He had come to the island primarily to learn everything he could about wireless from the technical library at the station, and so he applied himself with his characteristic energy to that task. Before the first year of his two-year term came to an end, he had already mastered the station's books and





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*Sarnoff at the Siasconset, Mass., station, 1908*

was eager to devour something else. The village of Nantucket, seven miles away, had a good library, and it was to this new store of knowledge that Sarnoff turned.

"I bought a secondhand bicycle cheap," he recalls, "and every couple of days I rode to town for a fresh supply of books. The island was a stormy place, and in winter the snow was piled so high and the winds were so severe that I could not use my bicycle. I used to walk to Nantucket and back frequently through blinding snowstorms. When the weather was too severe even for me to be out, I studied the company's technical books at the station until I knew them backward and forward."

Fresh from his Nantucket service in 1910, Sarnoff was ready for new experiences when he came back to New York, and the company provided them by sending him as wireless operator aboard such ships as the *S. S. Harvard*, operating between New York and Boston; and on several vessels of the Southern Pacific Line, sailing between New York and New Orleans.

These early training years were climaxed by the kind of adventure any teen-age boy, then or now, would have considered himself lucky to have. The Marconi Company was equipping several sealing vessels for voyages into the Arctic; and when it sent out a call for operators, there was no dearth of responses, in spite of the obvious perils. Sarnoff was one of those who volunteered, moved by his usual eagerness for new experiences. He was not deterred in the least by the talk he

heard in the company offices about the dangers of the expedition, so formidable that some believed the men on the ships would never come back alive.

Assigned to one of the largest vessels, the *Beothic*, young Sarnoff at 19 sailed northward toward the Arctic ice pack and one of the most remarkable adventures of his life.

## Chapter 4

# Arctic Adventure

On a frigid March day in 1911, Sarnoff came aboard the *Beothic* at St. John's to install and operate the ship's new wireless equipment for her sealing voyage to the Arctic. The vessel was owned by Job Brothers, merchants of that far northern port, who had ordered the new devices against the skeptical advice of other businessmen and most of the population, who could hardly bring themselves to believe in the invention.

None were more skeptical than the ship's crew, who watched with silent interest while Sarnoff strung up his aerial wires in temperatures of 20 degrees below zero—balmy, compared with what lay ahead for him.

"The crew of the boat was enormously impressed by the apparatus," Sarnoff remembered. "They were very suspicious of it, but since they were all anxious to

know how the rival ships were faring, they treated me with great courtesy. Most of the sailors were Newfoundlanders, an uneducated, illiterate lot who found it impossible to say 'Marconi' and compromised by calling me the 'Coni man.' The entire lot asked me daily, 'Any fresh news dis marnin', Coni man?'"

As the *Beothic* headed out of St. John's and began to thrust its prow northward toward the Arctic, she was accompanied by a sister ship, and the two of them butted the ice cakes together. It was the middle of March, but the water was still frozen solid. The two vessels traveled full speed ahead until resistance to the ice became too great for further progress. Then they reversed their engines, moved back a little, and crashed on through the clearing they had made.

The ships diverged at an agreed upon point, but the other vessel was no more than a thousand feet away when her captain signaled and shouted through his megaphone that the wireless had broken down. Only Sarnoff was qualified to repair it. The young operator regarded the ice sheet between the two ships without favor as he prepared to cross; and before he departed, he coaxed the ship's doctor into accompanying him.

"We were bundled up in heavy fur garments," he recalled later, "wore sealskin boots with spikes on the bottom to grip the ice, goggles over the eyes to prevent snow blindness, and carried gaffs or poles about six feet long to the end of which was attached an iron boat-hook to test the ice. Gingerly we made our way over to

the other boat. It did not help matters that the crews looked on, laughing at our cautious steps. Finally, however, we reached our goal and after about six hours, the wireless was in working order again. We started on the return trip. It had grown late, there was a sharp wind blowing, and the cold was intense. To add to our discomfort, the ice was broken and huge patches of slob, or soft ice, were floating in the water.

"The only way to make distance was to jump from one pan of ice to another, disregarding the water between. The Newfoundlanders can jump on a piece of ice, no matter how small, and keep their weight on it just long enough to get to the next sheet. But unfortunately we were not Newfoundlanders. At every step of the way, we fell in the water, grabbing at the ice en route, which, after we had mounted it, promptly broke in half and gave us a thorough ducking. In a few minutes we were played out and lay gasping on an ice cake that held us for the time. The crew, which was watching our plight, yelled instructions to us and confused us more and more.

"Just at this crucial moment the captain of the boat set the bow of the vessel straight for us and ordered full speed ahead. I will never forget how I felt when I saw the big ship bearing straight down on us, smashing the very sheets of ice on which we stood. To be caught between the two heavy sheets of ice and jammed into jelly wasn't exactly my idea of the proper ending for an ambitious young telegraph operator. The captain, however, immediately realized his blunder and sent out a dozen or

more 'ice trotters,' as these expert sealers were called. The doctor and I were ignominiously handed from man to man, and as a crowning touch, the last man carried us on board."

As the ship plowed on northward, Sarnoff's initiation into the Arctic way of life progressed, with the help of the crew. Before long he could trot about the ice fields as though they were solid land. The skepticism about him and his apparatus had nearly disappeared, too, particularly when he was able to relay a message to the captain that his brother was the father of a son. He followed that with a message of congratulations from Job Brothers after he had reported by wireless the bagging of 2,400 sealskins in two days.

As he watched the men hunt the seals, extract their oil, and strip them of their pelts, Sarnoff became fascinated with the work, and with the seals themselves. He had brought along a camera and was anxious to take pictures of the animals.

On Sundays the boat stopped. The men rested and held religious services in the hold. No one was allowed to kill seals on that day; a curious mixture of superstition and religion made it an unpardonable sin to the sealers, a fact that nearly led to the wireless operator's demise.

One Sunday afternoon the crew was lounging on deck watching a devoted seal family playing on the ice below. A proud father seal was putting up his protective hood and making weird noises to amuse a baby seal and

its mother, who were watching. The scene was too tempting for anyone with a camera. Sarnoff crawled over the side of the boat, camera in one hand and gaff in the other, and approached the little group stealthily.

He photographed the baby, but the father was still out of range. Sarnoff crept nearer to the young seal, thinking it might alarm the father enough to make him come out of the water and so bring him into the picture. Sarnoff came within five feet of the baby, but the father remained in the pool, his head above water, watching and motionless. The bold photographer came a little nearer, focused his camera on the big male, and deliberately took his picture. The click of the camera seemed to enrage the father. He pulled himself out of the water and waddled toward Sarnoff, throwing his huge bulk forward with surprising speed.

"I took to my heels and ran," Sarnoff says, "but as I ran, I had sufficient presence of mind to follow a zig-zag course. This gave me a slight advantage because it was difficult for my pursuer to twist his big body at every turn. We had progressed only a few feet and the seal, with murder in his eye, was gaining on me. But the strongest man could not long hold out on the jagged, slippery ice; I was near exhaustion. My breath came in gasps, and my knees shook. Suddenly a shot rang clearly in the still Arctic air. While the crew had watched my plight with awful fascination, one of the sailors had dared to break the Sabbath law and shoot the seal. I think the captain believed privately that it would have



been better if I had died a martyr to the law, but the man was never punished and all the men aboard heartily approved his action, none more heartily than I."

At his key in the wireless room, Sarnoff was meanwhile making friends, in the manner of operators, with men at other wireless stations who were at the far ends of his invisible lines. One of these was Jack Daw, chief operator at the lonely outpost of Belle Isle, the rocky, desolate island between Newfoundland and Labrador.

In an exchange of messages one day Sarnoff learned that Daw's assistant, W. F. Barrett, had fallen so ill that he could no longer take the relief trick. Sarnoff suggested that his friend, the *Beothic's* doctor, might be able to help. He had already prescribed by wireless for a seaman on a nearby vessel, and it would be no more difficult to radio medical advice across the 200 miles of ice and water that separated the ship from Belle Isle.

As the sealing went on, the doctor followed Barrett's case by radio, first with the curiosity that the use of the wireless still inspired in him, but then with professional interest and simple humanity as the story unfolded. Barrett's trouble had started with a simple toothache, which had developed into an abscess. Daw's medicine chest did not contain anything capable of dealing with it. Worse, Barrett's condition was soon beyond the reach of such uncomplicated measures, even if they had been available.

"Old man, I am up against it," Daw wirelessly. "Barrett seems to be getting worse instead of better. His

cheeks are swollen frightfully, his temperature is alarmingly high, and he can eat nothing. He has been unable to leave his bed for a week. I have done all I could for the poor chap, but the suffering has nearly driven him mad and broken me up considerably. Our only neighbors are the head lighthouse keeper, a Newfoundland; his assistant and the assistant's wife—French Canadians. There are two lighthouse keepers on the other side of the island, but it is almost impossible to reach them as we are separated by ten miles of wind-swept ice. A Canadian Government vessel comes twice a year bringing fuel and provisions, but during the ice season we see no one. Only sealing ships can navigate through the ice, and it will be three months before the Government vessel arrives. Unless my assistant improves or secures prompt medical attention, I shall lose him."

That message came on a Sunday when, by custom, the ship stood still until midnight. When Sarnoff gave him the news, the doctor shook his head doubtfully. All he could do was to prescribe simple remedies, such as a diet of milk and hot water, and to request regular reports. As the days passed, Barrett's condition grew worse. His suffering was intense. Daw reported that the abscess was now so large that Barrett could scarcely open his mouth, and had to take his food through a tube. Sarnoff knew that drastic measures had to be taken if the man's life were to be saved.

"I summoned sufficient courage to place the serious situation at Belle Isle before Captain Barbour," he

wrote later in the magazine *Wireless Age*. "It looked like a matter of life and death with poor old Barrett, for the last wireless reports stated that he was steadily sinking; and unless the abscess was given proper medical treatment, he could not hold out much longer.

"My efforts to have the ship turned toward Belle Isle were received with a kindly tolerance that held little encouragement. The ship was heavily laden and should it be taken into the ice floes, it might become jammed and remain for weeks with all the men and cargo on board. The captain explained what this would mean in financial loss and the danger to life and property in such an undertaking."

Dejected, Sarnoff went back to the wireless room and sat down before his instruments, trying to think of a way out. Through force of habit, he made the necessary adjustments that would put him in touch with Belle Isle. Jack Daw's insistent call pulled him back from his thoughts. The chief operator was anxious to know if anything had been done to get assistance for Barrett and pressed Sarnoff for details about the situation.

Daw's obvious deep concern for Barrett was so moving that Sarnoff could not bring himself to report how unpromising things were. Instead, he heard himself sending out exaggerated encouragement. Daw was so relieved by the prospect that the *Beothic* might come to his rescue that his touch on the key fairly snapped. Enthusiastic, hopeful messages buzzed into Sarnoff's earphones. He was sure everything would turn out all

right. When was the *Beothic* coming? As soon as he knew, he would tell Barrett the good news.

"It was terrible!" Sarnoff wrote. "There I sat, staring the cold reality in the face, not one chance in a thousand that the captain would relent—and a man whose companion's life hung in the balance telling me across space how grateful he was to me for arranging his deliverance. Several times I started to interrupt and tell him the truth. But I could not bring myself to it. Then, when I had stood it as long as I could, I grasped at one despairing chance and broke in to tell him that everything was not yet settled, but it could all be fixed up if he would send a message addressed to the captain stating that his companion was suffering helplessly; that the end was near, and unless we hastened with medical assistance it would be too late.

"I delivered this message to the captain, enlisting the doctor's aid in placing the case before him. We made a lengthy and strong appeal that from all indications reached the captain's heart. But he would not say definitely whether he would attempt the journey. It was evident that our plea had a marked effect, but the question lay with whether he could or would bring the vessel near enough to Belle Isle to permit a landing."

Several days went by in choking suspense. Sarnoff went on sending encouraging reports, and the doctor continued to prescribe as best he could. Then came a report from Daw that brought an anxious frown to the doctor's face. Driven beyond his endurance by Barrett's

suffering, Daw had attempted to operate on his assistant with a hot knife, which, of course, had led to further complications and a threat of blood poisoning. In despair, Daw wirelessly that Barrett was dying, and the doctor himself carried this information to Captain Barbour.

The Captain heard the news stolidly, and still without a change of expression on his face, he disclosed that the vessel was headed toward Belle Isle and had been for several days. In fact, he said, it would arrive there in six or seven hours. "Maybe I didn't feel like hugging the old captain," Sarnoff said.

Preparing for the landing, Sarnoff and the doctor gathered up everything they could find which might represent comfort for the patient—blankets, pillows, fur robes, all manner of liquids, including those carried ostensibly for medicinal purposes. The crew, caught up in the spirit of the mercy mission, contributed from their own stores, specifying several pounds of tobacco for Jack Daw, whom they all admired for standing by his companion and trying to save him. By this time the crewmen were following the unfolding story with fascination, hanging on every wireless report that came over Sarnoff's instrument.

The *Beothic* stopped two miles from Belle Isle and a party of ten—the doctor, the captain's son, seven crew members, and Sarnoff—began the journey across the ice toward the wireless station and the lighthouse, which stood starkly against the horizon in the distance.

This was no mean expedition in itself. The Belle Isle station was situated nearly 500 feet above sea level on a mountain of ice and snow, which made it look like an insurmountable glacier. By the time the party reached the summit, only three members remained—the captain's son, the doctor, and Sarnoff. They were completely exhausted. The hardy crew members had dropped out along the way and returned to the ship.

Jack Daw and the lighthouse keeper, delighted with their appearance, were there to meet them, having followed the party's progress over the last portion of terrain. They conducted their welcome visitors to the little wireless station. There, on a rickety old cot in the coldest, dreariest room Sarnoff had ever seen, lay Barrett. His hair was matted and his hollow cheeks were covered with a stubble that made his pallor even more marked. He was emaciated almost beyond recognition after 20 days in bed that had wasted him away to a pain-wracked, undernourished shadow. He was, as Daw had reported, near death.

"When he saw us," Sarnoff reported, "he broke down completely and great gulping sobs shook his frame as the tears coursed down his cheeks. We all volunteered a few cheery words and the doctor took him in hand, quieting him so effectively that within a few minutes he was able to describe briefly his condition and answer questions.

"The doctor joined me a few minutes later and said that a very dangerous abscess had formed and three



RCA

*At 19, when David was operator on the S.S. Beothic*

of the teeth must be removed at once. While he was not a dentist himself, he was willing to undertake the operation with the instruments he had brought along; but he was rather reluctant about leaving the patient afterward without further aid in case blood poisoning set in.

"I laid the proposition before Barrett, telling him what was necessary to give him relief and mentioning the danger of blood poisoning to a man in his sorry condition. I told him he must take his choice—either submit to the operation then and there and take his chances, or, if he wished, we would carry him back to the ship and take him to St. John's.

"He made his decision without the slightest hesitation. Under no circumstances would he leave his colleague, Jack Daw. That man had shown supreme loyalty and consideration and given him untiring care and attention, and he would never desert him where there was any alternative. If it was to be, he would end his days there rather than leave his companion.

"So the operation was performed, and the available remedies administered. It was a complete success, I am glad to say, and even before we left he had been relieved of his suffering and was sleeping peacefully."

If there had been any lingering doubts on the *Beothic* about the value of wireless, this rescue dispelled them. The doctor was a hero on the ship, and as the fact that wireless had saved Barrett's life seeped into the consciousness of the crewmen, Sarnoff was almost equally so. Some of the Eskimos on the ship who had helped



with the sealing were so overawed when they were told all the details of the story that they dropped on their knees before Sarnoff, much to his embarrassment, and murmured, "God bless you, Coni man."

There were two epilogues to the tale. The story spread rapidly and resulted in the creation of the Marine Medico Service, which has saved the lives of countless seamen the world over. Medical prescription by radio soon became part of the routine of ships' surgeons, and of the coast stations of the United States Public Health Service. It was, so to speak, Sarnoff's first unique contribution to wireless communications.

The second epilogue did not occur until April 1928, 17 years later, in the aftermath of one of the first attempts to fly the Atlantic, when the airplane *Bremen*, with its crew of three, landed on the Labrador coast. The first word of their safety, flashed to an anxious world, was signed by the wireless operator at Point Amour, W. F. Barrett. That name stirred memories in Sarnoff, who by this time was vice president and general manager of RCA. Twenty-four hours after Barrett's message had been received and printed in the newspapers, Sarnoff sent a message of his own flashing out from RCA's Broad Street station:

"Please telegraph me whether you are the same Barrett who worked with Jack Daw at Radio Station Belle Isle during 1911 when I was operator on seal fisher *Beothic* and visited you with doctor. David Sarnoff."

Several hours later the answer came back: "Greetings. Yes, am same dud. Hope you are having good time and health, and best fortune. Glad to hear from you. Thanks again for services rendered that 1911. Kindest regards. W. F. Barrett, Point Amour."

Nor was that the end of the coincidences. Further wireless reports from St. John's quoted Job Brothers as saying they had a fishing station on Greenley Island, where the fliers had landed, and that the men could be sure of plenty of food and comfortable quarters. Job Brothers, it appeared, were still in business. So, too, was Jack Daw whose name as operator appeared on further messages from the north, as the progress of the fliers was reported to the world. Daw was at one of these lonely outposts, still at his key, as was Barrett, who had been spared from death by the magic of wireless and 17 years later was able to use the same instrument to report the deliverance of three men who were blazing the trail for another era.

The Arctic adventure was over, and the *Beothic* was back in port. Sarnoff regarded the trip as an absorbing interlude in his continuing education in which he had learned much about seals and humanity; but he was eager now to continue learning—to take on bigger jobs and perhaps return to some kind of formal education in his field of a kind he could not get out of the company's library. He felt that his preliminary training was nearly over, and he was now ready for better things.

He was, in brief, ready to be Sarnoff, and he needed only a turn of events to send him skyrocketing on his way. That turn came as a result of one of the century's most spectacular events, and for young David Sarnoff it was just around the corner.

## *Chapter 5*

# The Titanic Sinks: A Career Begins

**T**he Marconi Company was well pleased with its operator, particularly with his stint on Nantucket, and they would have liked him to go back there, where good men were so hard to pin down for any length of time. But Sarnoff applied for a transfer to the Sea Gate station in Brooklyn, then the busiest wireless station in America. The company demurred. If he transferred he would have to take a \$10 salary cut. Sarnoff agreed. His eyes were on the future. The transfer was made, and in a few months Sarnoff was made manager of the station, one of the most important such jobs in the system—and he was not yet 20.

From his vantage point in Brooklyn, Sarnoff looked around for new opportunities. One soon presented itself. John Wanamaker, the department store entrepreneur

who was noted as a merchandising pioneer, had been examining the new invention, radio, with more than ordinary interest. He was always alert for anything which might advance his stores, and in radio he saw what he considered a dramatic possibility for advertising them. Consequently he had taken the revolutionary step of equipping both his New York and Philadelphia stores with powerful commercial wireless equipment.

The New York store needed an operator, and Sarnoff seized the opportunity. It was exactly the kind of job he wanted at the moment because the Wanamaker operator would be on duty only when the store was open, leaving the evenings free. That was what Sarnoff needed, because he had discovered simultaneously a way to get the technical education he wanted so badly.

Pratt Institute in Brooklyn was opening an evening engineering course for experienced men, which was designed to condense the usual three-year curriculum into one. Only a limited number of highly recommended students would be permitted to enroll. Sarnoff reasoned correctly that the Marconi Company would give him the necessary recommendation because anything he learned could only be to their advantage as long as he stayed with the organization. Thus in the fall of 1911 he began working at Wanamaker's and at the same time enrolled in Pratt.

It was a highly successful year scholastically. Of the fifty students who were permitted to begin the course, only a dozen survived by the end of the session, and Sar-

noff's name was near the top of these. But before the academic year was over, the operator at Wanamaker's had a success of another kind which made his name known to the nation.

He was sitting quietly at his instruments on a dull April afternoon in 1912 when suddenly he heard signals in his earphones: "*Titanic* struck an iceberg. Sinking fast." No details whatever, and no indication of the message's origin. Sarnoff immediately gave this information to the world through the press and concentrated on seeking further information through the air. In those days, the range of wireless communication was limited. To communicate with a ship as far away as 150 or 200 miles was regarded as a feat. However, Sarnoff kept pounding away with his key at the Wanamaker station in New York and alerted all ships at sea within range of his signals.

After several hours of straining at his receiver while an anxious world was waiting breathlessly for definite information, Sarnoff succeeded in establishing communication with the S.S. *Olympic*, which was then at sea some 1,400 miles from New York. The wireless operator on the *Olympic* told Sarnoff that the *Titanic* had sunk with a heavy loss of life; that the S.S. *Carpathia* had picked up many survivors and was bound for New York.

This was the first definite information received about the fate of the *Titanic*, and Sarnoff immediately gave it to a waiting world. Then he concentrated his

efforts on establishing communication with the *Carpathia*, and kept asking for the names of survivors.

The implications of the tragedy raced through Sarnoff's mind as he bent over his instruments. Like all Americans who read the newspapers, he knew that the proud ocean liner *Titanic* had been regarded as unsinkable, and that she was already the ship of the rich and famous on their way across the Atlantic. She had sailed from Southampton on April 10, her passenger list crowded with well known names.

Her sinking, as it proved, was one of the most dramatic in the history of navigation, and is still an absorbing story a half-century later, as a recent best seller proved. When the disaster occurred, the news astounded the world and it was Sarnoff, sitting alone at his wireless receiver for 72 hours, who gave the world its only story of the tragedy.

As soon as the news had electrified the nation, President Taft ordered every other wireless station in the country to shut down, to eliminate every possible interference. Even so it took remarkable skill and endurance in those days of weak signals, primitive circuits, and deafening atmospheric interference to maintain contact with the sinking ship, and with those who were coming to the rescue of her survivors.

When word got around that a list of these survivors was being received by the Wanamaker operator, the store was besieged by relatives, friends, and the usual curiosity seekers. A police cordon was thrown

around the building where Sarnoff sat, hour after hour, taking down the names as they were identified and transmitted. A few of the relatives were admitted to the wireless room. They included Vincent Astor, whose father was on the *Titanic*, and the sons of Isidor Straus and his wife, who were also on the ill-fated vessel. These anxious people came into Sarnoff's wireless cabin and watched over his shoulder as he received and wrote the names of the survivors.

"It was the most trying experience I ever had," he said later. "Imagine this pitiful crowd sobbing when the names of their relatives were omitted, or weeping for joy if the name of some dear one was announced."

The ship had been crowded with rich Americans returning from Europe. Vincent Astor sorrowfully learned that his father had drowned. The Straus family heard the tragic news that both Isidor Straus and his wife had gone down.

After his endurance trial, with the earphones never removed from his head for 72 hours, Sarnoff was given relief and hustled over to the Sea Gate station, where there was better communication with the *Carpathia*, which by that time was coming in with the survivors. Then, for ten hours more, he sat at the Sea Gate key, getting more names of the missing. When the last of the 706 survivors was identified, Sarnoff rose from the instrument, pale and shaking. He had a Turkish bath and a 12-hour sleep, after which he reported to work again, as good as new.



The repercussions of this tragedy were far-reaching. In the investigative clamor that followed, it was pointed out that a ship equipped with wireless was much nearer to the *Titanic* than the *Carpathia*, the chief rescue vessel, but her only operator was in bed. Obviously there must be better wireless service at sea, both the public and the newspapers cried. Congress, urged to act, soon passed a law requiring wireless equipment and operators on all oceangoing vessels carrying more than 50 passengers. The act also required an around-the-clock watch, with two operators, and an independent auxiliary source of power for the equipment. Within another year, more than 500 American ships were so equipped.

"Wireless" was a word on everybody's tongue in the aftermath of the tragedy, but oddly enough, its very usage doomed it as the common word for Marconi's invention. People began to saw off "radio" from its full name, "radio wireless telegraphy," and use it as a kind of shorthand. Within a decade it was part of the language. The United States Navy preferred the term radio-telegraphy, and adopted it, but in time "telegraphy" was shorn from that usage too.

The effect of the *Titanic*'s sinking on the fortunes of the Marconi Company was nothing less than spectacular. Every newspaper story—and there were thousands of them—about the tragedy and its aftermath constituted free advertising for the company, which was virtually certain to be mentioned in all of them. Wireless was suddenly in the public mind all over the world,

and the astute Marconi managers took advantage of their situation. They found financiers more than willing to advance capital for expansion, and for buying up their chief competition, United Wireless Company.

Almost overnight the company's coastal stations increased from five to fifty. Another competing company was acquired and the number grew to 54. The Marconi Company was now the largest of its kind in the United States, a virtual monopoly, and its star was rising every day.

As for the gallant operator at the Wanamaker Station, his name was almost as prominent as the company's, and it was only natural that he should play a major part in the organization's sudden and rapid expansion. It was a tremendous undertaking, and Sarnoff, as the directors realized, was the one man in the company superlatively qualified to help them. He was made instructor of operator trainees, then inspector of all Marconi equipment being installed on passenger ships under the new laws, and the inspector of all stations as well. He rose rapidly from chief inspector to assistant traffic manager, assistant chief engineer, and then to commercial manager, under the benevolent supervision of Edward J. Nally, later the company's president, who understood what an asset he had in Sarnoff. Thus the young wireless operator, now a young executive, entered the infant radio industry on the ground floor, when it was having severe growing pains that he would do much to solve.

The beginning of World War I presented an immediate problem, because the Marconi Company was actually controlled from London, a point of irritation to the United States in the developing crisis. As soon as the American armies entered the war, the government seized most of the Marconi facilities for the duration—and found in Sarnoff a commercial manager who proved to be of inestimable help in harnessing those facilities to military uses.

War was of course the largest, but it was not the only problem the wireless industry faced. As in all major inventions, there was an immensely complicated patent fight to be settled. Westinghouse, General Electric, American Telephone & Telegraph, and the United Fruit Company were all in possession of basic radio patents, but the patents were so scattered that no one company had enough to make a complete transmitting or receiving system without infringing on the rights of one of the others. There were wild claims, counterclaims, and bitter courtroom battles. Lee de Forest himself had gone on trial in 1912, charged with selling fraudulent stock for his wireless system. The validity of this charge could be judged by its language, in which the invention that made de Forest famous was described as “a strange device like an incandescent lamp, which he called an Audion, and which device was proved to be worthless.”

Nevertheless, so great was the ignorance of the judiciary as well as the public about what de Forest and his fellow scientists were doing, the inventor barely

escaped going to jail and was given a stern lecture by the court on the advisability of "getting a common garden variety of job and sticking to it."

With the United States' entry into the war, government control brought a momentary stability to the industry, but as soon as peace came, chaos threatened once more. Only one man in Washington appeared seriously interested in doing something to avert a return to the disastrous prewar situation. Franklin D. Roosevelt, then Assistant Secretary of the Navy, made no secret of the fact that his division of the armed forces believed it had a large stake in the future of radio. Peacetime uses, as well as the role radio had played in the war at sea, had been convincing proof to him and to other Navy men that the orderly development of wireless transmission was indispensable.

The Navy, in fact, wanted government control of coastal and international radio in peacetime, and when Congress shuddered away from such a solution, some Navy officers then proposed to create a private American company controlling radio communications to and from the United States. This debate, in essence, was not unlike the controversy that broke out in the country early in the 1960's over control of a proposed satellite communications system. In the earlier battle, as in the later one, private enterprise was the victor.

As an executive of the Marconi Company, Sarnoff was in the midst of the struggle, but his thoughts for the moment were not directed primarily toward it. He was

fascinated, as always, by the prospects and possibilities of the new medium, and wondering what could be done with it.

Sarnoff was well aware of the several interesting experiments that had already been made. As early as 1906, about the time young David was landing his first job with the Cable Company, an inventor named Reginald A. Fessenden, who had a station at Brant Rock, Massachusetts, was installing a high frequency alternator combined with a telephone mouthpiece and receiver. The alternator had been the invention of Dr. Ernest F. W. Alexanderson. Over this system, on Christmas Eve, Fessenden broadcast a recorded program that included a violin solo, a vocal solo, and a poetry reading. He followed these numbers with a request that anyone who had heard it report the circumstances to him at Brant Rock. He was showered with reports from ship operators at sea who told him how amazed and delighted they had been to get the broadcast, which was probably the first experimental radio broadcast ever made.

A year later de Forest began his experiments with radio broadcast talks and recorded music from his New York laboratory in the Parker Building, and in 1910 he scored a historic triumph by broadcasting Enrico Caruso's voice directly from the stage of the Metropolitan Opera during a regular performance. At least 50 listeners reported, with the same wonder and pleasure the ship operators had shown four years before, that they had heard Caruso's voice clearly.



RCA

*With Dr. de Forest on the Audion's 40th anniversary*

Sarnoff himself had performed a dramatic experiment of his own in 1914. That May he was on his way to New Orleans by ship as a delegate from the Marconi Company to a convention of Railway Telegraph superintendents. As he and a gathering of other delegates lounged about in the saloon of the steamship *Antilles*, 60 miles out of New York harbor, Sarnoff excused himself and slipped out to the radio room, where he put on the headphones and tuned in a shore station. Then he summoned his companions to come and listen. What they heard was a program of phonograph music coming from Sarnoff's old station at Wanamaker's, where he had for some time been directing experiments in transmitting music.

The delegates were astounded, and most of the voyage was taken up with endless discussion about the future of radio. It was the kind of discussion Sarnoff would be having all his life, and he enjoyed it thoroughly. He had no doubt about what was going to happen to radio, and he was glad to hear from the delegates that most agreed with him that at least it had wide possibilities.

Later in the year Sarnoff told a radio conference he would someday make voices and music from Great Britain audible in the United States, and there were still some skeptics in the audience who thought he was mad. Only six months afterward, in March 1915, he startled listeners to the Wanamaker station with a concert, unannounced, coming from the Savoy Hotel in London.

With all this impressive pioneering, however, radio could hardly have been called an industry in its pre-World War I stage. The general public knew little or nothing about it except what the *Titanic's* sinking had inspired. Those who were informed about communications did not take too seriously de Forest's revolutionary invention of the three-element vacuum tube he called the Audion. With only a few exceptions, they could not visualize the Audion as it would shortly become—the heart of radio. In general, these experts thought of wireless, or radio, as an interesting toy, a comparatively unprofitable service that represented no real challenge to conventional telegraphy.

De Forest and the others had prepared the ground, but it was Sarnoff who in 1916 first proposed the bold and imaginative use of the new medium as a home instrument for mass consumption. For a young executive it was the kind of gamble almost certain to be coolly received by older if not wiser heads. At the time he was assistant traffic manager of the Marconi Company, an important but not an exalted position. But he sat down one day and wrote a memorandum to Nally, then vice president and general manager of the Marconi Company, a memo that has become famous in broadcasting history as the "Radio Music Box" memo. He wrote:

"I have in mind a plan of development which would make radio a 'household utility' in the same sense as the piano or phonograph. The idea is to bring music into the house by wireless.



"While this has been tried in the past by wires, it has been a failure because wires do not lend themselves to this scheme. With radio, however, it would seem to be entirely feasible. For example—a radio telephone transmitter having a range of say 25 to 50 miles can be installed at a fixed point where instrumental or vocal music or both are produced. The problem of transmitting music has already been solved in principle and therefore all the receivers attuned to the transmitting wave length should be capable of receiving such music. The receiver can be designed in the form of a simple 'Radio Music Box' and arranged for several different wave lengths, which should be changeable with the throwing of a single switch or pressing of a single button.

"The 'Radio Music Box' can be supplied with amplifying tubes and a loud speaking telephone, all of which can be neatly mounted in one box. The box can be placed on a table in the parlor or living room, the switch set accordingly and the transmitted music received. There should be no difficulty in receiving music perfectly when transmitted within a radius of 25 to 50 miles. Within such a radius there reside hundreds of thousands of families; and as all can simultaneously receive from a single transmitter, there would be no question of obtaining sufficiently loud signals to make the performance enjoyable. The power of the transmitter can be made 5 kw if necessary, to cover even a short radius of 25 to 50 miles; thereby giving extra loud signals in the home if desired. The use of head

telephones would be obviated by this method. The development of a small loop antenna to go with each 'Radio Music Box' would likewise solve the antennae problem.

"The same principle can be extended to numerous other fields—as for example—receiving lectures at home which can be made perfectly audible; also events of national importance can be simultaneously announced and received. Baseball scores can be transmitted in the air by the use of one set installed at the Polo Grounds. The same would be true of other cities. This proposition would be especially interesting to farmers and others living in outlying districts removed from cities. By the purchase of a 'Radio Music Box' they could enjoy concerts, lectures, music, recitals, etc. which may be going on in the nearest city within their radius. While I have indicated a few of the most probable fields of usefulness for such a device, yet, there are numerous other fields to which the principle can be extended. . . ."

His idea was received with polite silence by the company. They valued their young assistant traffic manager, but apparently, as Sarnoff remarked without rancor years later, "they considered it a harebrained scheme."

There was some compensation for the cool reception his great idea had met. He was in love. Sarnoff had been far too busy with the development of wireless and his own career to think about girls until now, but

his mother was about to do the thinking for him. After all, his mother said, David was 25 years old, and not getting any younger day by day, and still he wasn't married. It was time, she said, chatting with her neighbor in the modest Bronx neighborhood where the family had moved from the East Side.

The neighbor agreed. David was a nice boy, a good boy, she said, and he ought to get married. Her daughter, Lizette, was in a comparable position, and it was possible, it might be . . . Both women agreed that these two likely matrimonial prospects should meet, and it did not take them long to arrange it.

Lizette and her mother were Parisian, or at least Lizette had been born there and the family had come to America from the City of Light. Somewhere her mother had learned English, more than well enough to conspire with Mrs. Sarnoff, but poor Lizette was still struggling with the new language and spoke not enough even to carry on a normal conversation. Sarnoff, needless to say, had never had an opportunity to learn French.

Nevertheless, under the watchful eyes of the mothers, they met one night when David paid a formal call. Years later Lizette recalled: "I made no impression on him, and he made none on me." The budding expert in communications could not communicate at all with the pretty Parisian, and both concluded that the evening had been a bore.

The mothers were dismayed, but hardly discouraged. The course of love, they agreed, never runs

smoothly; everybody knew that. They pushed and prodded, gently and subtly, for the next four months. Lizette, meanwhile, perhaps sensing the inevitable, was busy learning more English. When the two met again, she could speak enough to rescue the evening from collapse. "This time it took," Lizette has said.

She did not have to make much conversation; Sarnoff took care of that. But now she could understand a good part of what he was saying and ask an intelligent question once in awhile to stimulate him. Not that he needed stimulation. He was full of the radio music box idea and he poured out his dreams to this charming young girl who listened so well.

"He tried to tell me of something that he was sure would happen," Lizette later recalled. "'We will have a box,' he said, 'and we will push a button and out of it will come the voice of Caruso.' He was so enthusiastic that it was interesting just to watch him talk about that wonderful, magical music box that was being born in his head."

On July 4, 1917, they were married. The mothers were happy, and the newlyweds were even happier, as they are still today, nearly a half-century later.

In those days before the technological revolution of the 1920's, the scientists were busy but Sarnoff's active, perceptive brain was often well ahead of them. Not only did he visualize radio communications over long distances, but he had begun to think in terms of short-wave radio at a time when the scientists were not yet well



RCA

*Sarnoff as commercial manager of RCA, 1919*

aware of its great possibilities. The engineers, in fact, thought him visionary; and Sarnoff knew they did not agree with him, nor share his beliefs, yet he was already displaying his tendency, later to become so well known, to hold out against all objections once he had become convinced an idea was feasible. His standard, polite reply to the skepticism of the engineers was a succinct, "I doubt whether a careful and exhaustive research has been made on this point."

The time was at hand, however, when he would have the power, the position, and the resources to prove his beliefs. In 1919, the Marconi Company began to negotiate with General Electric for exclusive rights to the Alexanderson alternator, at that time the best long-range radio transmitter available. Since Marconi was still controlled by British interests, the Navy was alarmed anew by what it considered a foreign threat to the independence of United States communications, and Assistant Secretary Roosevelt interposed the weight of his office. He sent emissaries to Owen D. Young, then vice-president of General Electric, in an attempt to persuade him that the Marconi move must be halted by creating an American super-company to control communications.

Young agreed, and in November 1919 the Radio Corporation of America was formed, with Young as chairman and the majority ownership residing with General Electric, although in the next two years both Westinghouse and American Telephone & Telegraph became large stockholders. The first act of the new corporation

was to buy out the American operations of the Marconi Company.

Sarnoff was acquired, along with his company, and was at once appointed commercial manager of the new organization. He was, quite naturally, overjoyed by this development. For the first time in his life he found himself with an organization that was capable of doing anything it wanted to do in the field of communications. In his early years with Marconi, the company had been struggling, like Sarnoff himself, for a place in the sun. Then, when it suddenly found prosperity after the *Titanic* disaster, it was so busy installing marine communications that it had no time to break new ground before the war came. Now, with the war over and the restraining ties of absentee ownership broken, a new company backed up by ample capitalization was in a position to explore the future. It was all David Sarnoff could have asked for, and he wasted no time in grasping the opportunity.

## Chapter 6

# Radio Comes To America

Only two months after RCA was organized, Sarnoff was knocking on the door of its board chairman, Owen D. Young, with his "Radio Music Box" idea. In a new and longer memorandum, he repeated his original proposal and added a plan to connect the magazine *Wireless Age* with the sale of radio music boxes, "thereby making the Wireless Press a profitable venture."

Here was an example of Sarnoff's mind at work. In this plan he was not only proposing the manufacturing of home radio sets, then unknown, but suggesting magazine merchandising methods and forecasting editorial techniques that were still in the future. He wrote:

"Every purchaser of a 'Radio Music Box' would be encouraged to become a subscriber of the *Wireless Age* which would announce in its columns an advance month-



ly schedule of all lectures, recitals, etc. to be given in the various cities of the country. With this arrangement the owner of the 'Radio Music Box' can learn from the columns of the *Wireless Age* what is going on in the air at any given time and throw the 'Radio Music Box' switch to the point (wave length) corresponding with the music or lecture desired to be heard.

"If this plan is carried out the volume of paid advertising that can be obtained for the *Wireless Age* on the basis of such proposed increased circulation would in itself be a profitable venture. In other words the *Wireless Age* would perform the same mission as is now being performed by the various motion picture magazines which enjoy so wide a circulation.

"The manufacture of the 'Radio Music Box' including antenna, in large quantities, would make possible their sale at a moderate figure of perhaps \$75.00 per outfit. The main revenue to be derived will be from the sale of 'Radio Music Boxes' which if manufactured in quantities of one hundred thousand or so could yield a handsome profit when sold at the price mentioned above. Secondary sources of revenue would be from the sale of transmitters and from increased advertising and circulation of the *Wireless Age*. The Company would have to undertake the arrangements, I am sure, for music recitals, lectures, etc. which arrangements can be satisfactorily worked out. It is not possible to estimate the total amount of business obtainable with this plan until it has been developed and actually tried out but there

are about 15,000,000 families in the United States alone, and if only one million or 7% of the total families thought well of the idea it would, at the figure mentioned, mean a gross business of about \$75,000,000 which should yield considerable revenue.

“Aside from the profit to be derived from this proposition the possibilities for advertising for the Company are tremendous; for its name would ultimately be brought into the household and wireless would receive national and universal attention.”

Having forecast home radio, radio programs in magazines, a broadcasting system, and the future of RCA, Sarnoff sat back and waited to see what would happen. This time his superiors took him seriously. Two months later, E. W. Rice, Jr., then president of General Electric, asked him to estimate prospective radio business if his proposal were adopted, and Sarnoff responded with this uncannily prophetic letter:

“The ‘Radio Music Box’ proposition . . . requires considerable experimentation and development; but, having given the matter much thought, I feel confident in expressing the opinion that the problems involved can be met. With reasonable speed in design and development, a commercial product can be placed on the market within a year or so.

“Should this plan materialize it would seem reasonable to expect sales of one million (1,000,000) ‘Radio Music Boxes’ within a period of three years. Roughly estimating the selling price at \$75 per set, \$75,000,000

can be expected. This may be divided approximately as follows:

|                                   |                       |
|-----------------------------------|-----------------------|
| 1st Yr.—100,000 Radio Music Boxes | \$ 7,500,000          |
| 2nd Yr.—300,000 Radio Music Boxes | \$22,500,000          |
| 3rd Yr.—600,000 Radio Music Boxes | \$45,000,000          |
| Total .....                       | <u>\$75,000,000."</u> |

The accuracy of this prediction was nearly total. In the first year RCA began making "Radio Music Boxes," 1922, its sales were \$11,000,000, slightly higher than Sarnoff had figured, but the second-year sales were exactly what he had said they would be, and the third year was only \$5,000,000 higher.

These figures resulted from a \$2,000 initial investment, which was what the RCA board of directors allowed Sarnoff in 1920 after they had read and digested his two memos. With this pitifully small sum he was expected to develop a radio broadcast receiver and demonstrate its value. To anyone but Sarnoff it would have seemed hopelessly inadequate.

His cause was immeasurably aided only a few months after RCA placed its first production order with General Electric for Radio Music Boxes when a Westinghouse engineer, Dr. Frank Conrad, began the first broadcasts as they are known today over Station KDKA, in East Pittsburgh. To create an audience for these pioneer broadcasts, Westinghouse began to make and sell the crystal sets known to their lucky owners as "cat's whiskers." They were primitive, but they were good enough to permit people in Pittsburgh to hear KDKA. Then, in

November 1920, the station created a sensation by broadcasting the Harding-Cox Presidential election returns.

The response to that broadcast, and the shower of newspaper editorials and letters-to-the-editor that followed it, spurred on Sarnoff and everyone else at RCA, which had already begun to make crystal sets too, and early in 1921 followed them with the first battery-and-tube sets, known as Radiolas, which were made by General Electric.

It was a new Sarnoff experiment, however, that pushed the burgeoning radio business over the top and made it a national institution overnight. In the blistering early summer of 1921, the talk was not so much of the Harding "normalcy" the new President had brought to Washington as it was about the approaching heavyweight championship fight between Jack Dempsey and the French champion, Georges Carpentier. Dempsey, a magnificent and colorful fighter, had caught the national fancy after winning the title from Jesse Willard in 1919, and it had been a splendid piece of matchmaking to pit him against the handsome and accomplished Carpentier, giving the fight an international flavor. With interest in the approaching battle at a fever pitch, Sarnoff concluded that this was the ideal event to put on the air. No other piece of programming could have attracted so much national interest.

Borrowing a portable Navy transmitter, he set to work arranging a remote broadcast from the ringside at Boyle's Thirty Acres, in Jersey City. Sarnoff enlisted the

help of Major J. Andrew White, a popular figure himself who was then editor of *Wireless Age*, to help him in setting up the broadcast, and White in turn hired two radio experts to help him. After getting the permission of the Lackawanna Railroad to use its property, they strung an aerial from the clock tower on the railroad terminal in Jersey City to a steel tower. A galvanized iron shack, used by Pullman porters as a dressing room, was converted into a broadcasting station.

Tex Rickard, manager of the match, who was then coming into his own as one of the great promoters of the day, was quick to see the immense potential advantages of broadcasting to the fight business and arranged with the National Amateur Wireless Association to install receivers and loudspeakers in more than a hundred theatres, lodge halls, ballrooms, and barns from Maine to Florida, fairly well covering the eastern half of the country, which represented the listening range in those days.

When the gong rang for round one, Major White was at the ringside to give a blow-by-blow description, with Sarnoff at his side, and an engineer named J. C. Smith was in the galvanized iron shack to relay the description, which enabled between 200,000 and 300,000 people to follow the fight until Dempsey's victory by a knockout in the fourth round.

It was a triumph for radio. Not only was the fight heard by the owners of sets and those who had heard it in the public broadcasts arranged by Rickard, but it

was listened to by many amateur operators whose reaction was most enthusiastic. It must have occurred to some of these listeners after the final gong that they had heard more details about the fight than were seen by a good many of the spectators who had trudged through the July heat and dust of a torrid afternoon to the oven of the wooden stadium. The possibilities of radio reception undoubtedly were unveiled to millions of people that day.

Most of these early listeners were using crystal detectors, which of course had no tubes. But the development of the vacuum tube as a sensitive detector and amplifier was progressing rapidly, and it proved to be the technical device that assured a quick expansion of the radio audience.

Another spur to expansion were the wireless amateurs, nearly 5,000 of them by that time, who had provided trained radio telegraphy operators for World War I and now were abandoning their dots-and-dashes to talk with each other through the radiophone. They were builders of receiving sets, and as they listened with them they constituted not only the beginnings of an audience but they provided a ready-made field testing laboratory for the engineers at RCA and other companies. The amateurs were the first to take up the vacuum tube and abandon the spark-gap crystal set. They were first to explore shortwave, and they were constantly helpful with the information they turned up in building their own transmitters and receiving sets. Many of them

graduated into the new radio industry as it developed into the giant it became.

That industry was virtually exploding in every direction. In the same year Sarnoff broadcast the Dempsey-Carpentier fight, he invited such world famous scientists as Albert Einstein, Irving Langmuir, and Charles Steinmetz, "the Wizard of GE," to inspect RCA's new trans-oceanic station at New Brunswick, New Jersey, where he gave them a demonstration. On April 29th of that year, he had been promoted to be general manager of the company.

A year later radio had become a national craze. Stations were springing up across the country like flowers after rain. Newspapers, not yet suspicious of the new medium as an advertising competitor, were helping to build the audience by printing do-it-yourself supplements for people who wanted to build their own sets. All over the country listeners were twisting the numerous dials of the new sets that were being developed, sitting up hour after hour with the headphones clamped to their ears until they took them off in the early morning hours, rubbing the circulation back into their numb appendages. Some of the amateur's symbols crept into the language. People told how they had sat up the night before getting "DX," meaning distance. Everyone listened to KDKA, but it became an indoor sport to log stations and a status symbol to be able to receive stations broadcasting from long distances away, the farther the better.

There was more for set owners to hear with every passing month. In the fall of 1922, the Princeton-Chicago football game became the first remote pickup of that sport transmitted for broadcast in another city, and it was only a few more years until the fans were listening to Graham MacNamee's breathless broadcasts from the Rose Bowl on New Year's Day. Music lovers heard the New York Philharmonic Orchestra for the first time on November 22nd of that year, and the regular Sunday concerts were soon a national institution.

A few months later the first radio commercial went on the air, and oddly enough it was for a product not often advertised by radio today—real estate. Sponsored by the Queensborough Corporation on behalf of its new apartments in Jackson Heights, the commercial introduced a gentleman from the firm named Blackwell who spoke for 15 minutes with considerable feeling on an extremely high level about Nathaniel Hawthorne and his ideal of the healthy country life (some listeners wondered if he hadn't confused Hawthorne with Thoreau) and how that life could be attained within sight of New York City by living in the rural atmosphere of Jackson Heights. The Queensborough Corporation paid slightly more than \$100 for its message; the rate had been set at that figure for ten minutes of air time. Rates rose rapidly thereafter.

In the first two years of radio, between 1920 and 1922, Americans spent an incredible \$100,000,000 for sets, tubes, headphones, and batteries. In another two



years, the number of home receivers had reached an astonishing 3,000,000, most of whose owners in 1924 drew their chairs up close to the gooseneck speakers attached to the new superheterodyne sets so that they might better hear the throaty, fading voice of William Jennings Bryan, in the sunset of his career, speaking from the Democratic National Convention in Madison Square Garden. Broadcasting, Bryan proclaimed, was "a gift of Providence," and so it seemed to those who heard him.

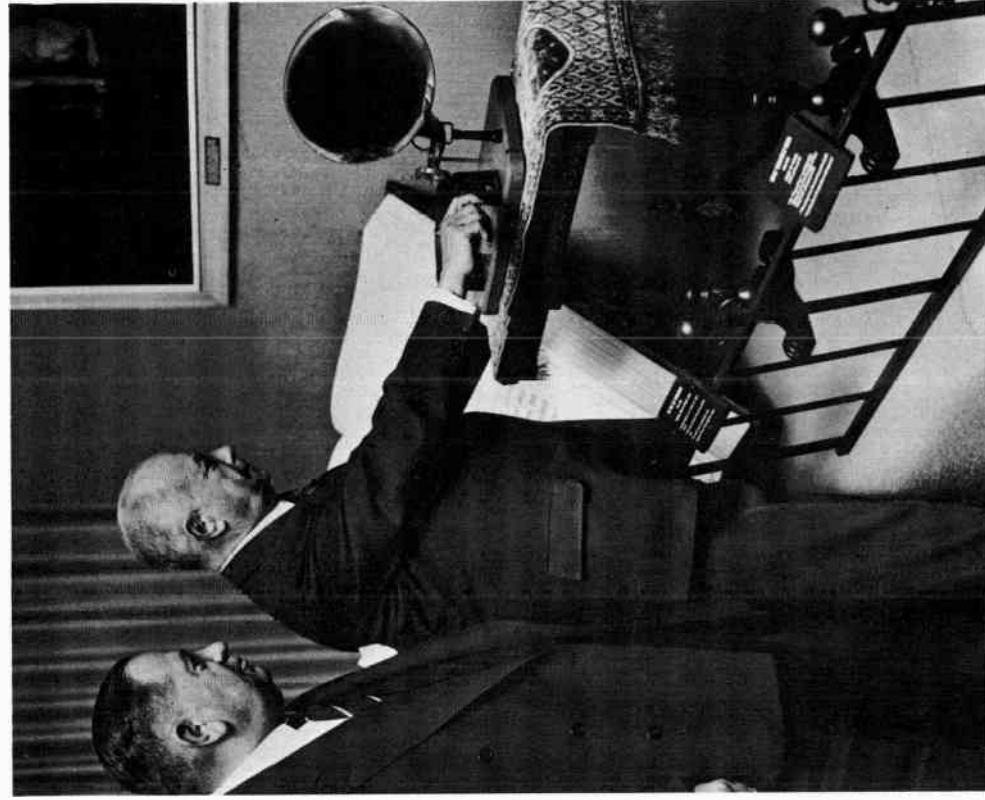
Americans less than 40 years old today, to whom radio is an ever-present commonplace that travels with them anywhere they want to go, can scarcely realize what the new medium meant to those who were old enough to listen in the 1920's. A door to the world had opened for millions of people in small towns and on lonely farms. With a twist of the dial they were transported to Carnegie Hall, to distant football fields, to nightclubs and ballrooms where the new dance music was being played, and eventually to any place where a microphone and remote transmitting equipment could be placed, which meant that they were vicarious witnesses of news events. It was a transformation in national life perhaps even more remarkable than the one produced later by television.

Sarnoff seemed to be clairvoyant about radio's future as he pushed at its frontiers in a half-dozen directions. In a 1922 report to President Nally of RCA, he expressed again his confidence in the use of short,

rather than long, waves and high-power stations as a means of attaining transmission speed and reducing static. He hounded RCA's executives to build super-power broadcasting stations until, in 1925, they constructed the first of many at Bound Brook, New Jersey, which was connected with the company's New York studios by three sets of land wires, linking ten stations. That hookup set the stage for the advent of network radio in 1926.

As early as 1922, Sarnoff had conceived the network that would become the National Broadcasting Company. In a letter of June 17, 1922, to E. W. Rice, Jr., honorary chairman of the board of General Electric, he had written:

" . . . It seems to me that in seeking a solution to the broadcasting problem, we must recognize that the answer must be along national rather than local lines for the problem is distinctly a national one. . . . I think that the principal elements of broadcasting service are entertainment, information and education, with emphasis on the first feature—entertainment; although not underestimating the importance of the other two elements. . . . The service to be rendered distinctly calls for a specialized organization with a competent staff capable of meeting the necessities of the situation. Let us organize a separate and distinct company, to be known as the Public Service Broadcasting Company, or American Broadcasting Company, or some similar name."



*Sarnoff examines the first RCA-Victor phonograph*

In 1926, the first step toward the realization of this idea was taken when RCA bought radio station WEAJ in New York from the American Telephone and Telegraph Company for \$1,000,000. RCA incorporated this property under the name of the National Broadcasting Company, and WEAJ became the key station of what was known as the Red Network, as distinct from the later RCA-owned Blue Network, of which WJZ was the key station.

To those who were fearful that radio would do away with the phonograph (it was also freely predicted that it would mean the end of books and magazines), Sarnoff answered in 1922 that the opposite could be expected. All the industry had to do, he said, was to combine these two home instruments in one cabinet. Thus the radio-phonograph industry, a large part of RCA's product today, had its beginnings.

A year later Sarnoff was forecasting accurately that "everything which moves or floats will be equipped with a radio instrument; the airplane, the railroad, steamship, motorboat, automobile and other vehicles."

Everywhere he went RCA's general manager was a man who pointed the way toward the future. Addressing the New York Electrical Society in 1922, he demonstrated the possibilities of international broadcasting by calling England, France, Germany, and Norway with a telegraph key. He got a reply from each country.

Two years later, in 1924, he was standing in the auditorium of the University of Missouri before an

audience of hundreds of rural residents who were there for "Farmers' Week." Picking up a long-distance telephone, he dazzled his listeners by sending a message via the RCA station in San Francisco to the Iwaki station in Japan, receiving an answer immediately over 14,000 miles of land and ocean. It was the first time radio communication had ever been established across an ocean, and then relayed successfully so far inland.

Sarnoff was fond of these demonstrations, which were always amazing to others, and sometimes even to Sarnoff himself. One day in the early 1920's he was talking by radio telephone to Captain Rind, of the steamship *America*, which was 800 miles at sea. During the conversation he was cut off, and as he would have in an ordinary domestic call, he jiggled the receiver impatiently and said to the operator when she answered, "You've cut me off."

"What number were you calling?" she responded, in a routine way.

"I was talking to a man on the Atlantic Ocean," Sarnoff said, beginning to enjoy the situation. There was a gasp at the other end of the line, but the operator was not one to depart easily from training. Her voice was frightened and subdued but she gave him the proper answer: "I will give you information, sir."

While he was talking with the *America*, his Irish maid at home (he had been making the call at a neighbor's house) happened to tune in the radio to Deal Beach, the station through which the call had been placed,

and heard her employer's voice. She listened for an incredulous moment, then ran through the house to see if he had come home without her knowledge. Convinced that he was nowhere about, she fell to her knees, certain that Sarnoff had died somewhere and that she was in communication with his ghost.

"I got almost the same kind of shock myself not long afterward," Sarnoff said later. "I had made an address on the pallaphotophone, a device for photographing the voice, and the address had been recorded by the instrument itself. Two months afterward, at my home in Mount Vernon, I tuned in on WGY at Schenectady, 150 miles away, just in time to hear the announcer say, 'The next speaker will be David Sarnoff, who will talk about the pallaphotophone.' So there I sat in eerie silence, listening to myself lecture from 150 miles away."

In his ebullient and nearly always accurate prophesying, Sarnoff did not confine himself to radio. One of his most remarkable statements came in a memorandum dated April 5, 1923, which he submitted to the RCA directors. It read:

"I believe that television, which is the technical name for seeing instead of hearing by radio, will come to pass in due course. . . . It is not too much to expect that in the near future when news is telegraphed by radio—say to the United States, of important events in Europe, South America or the Orient, that a picture of the event will likewise be sent over by radio and both

arrive simultaneously. Thus it may well be expected that radio development will provide a situation whereby we will be able actually to see as well as read in New York, within an hour or so, the event taking place in London, Buenos Aires or Tokyo.

"I also believe that transmission and reception of motion pictures by radio will be worked out within the next decade. This would result in important events or interesting dramatic presentations being literally broadcast by radio through the use of appropriate transmitters and, thereafter, received in individual homes or auditoriums where the original scene will be re-enacted on a screen, with much the appearance of present day motion pictures.

"This re-enactment may, of course, be accompanied by music or speech of the original performance, thus conveying the impressions of sight and sound simultaneously to the broadcast listener and observer. The problem is technically similar to that of radio-telephony though of more complicated nature; but, within the range of technical achievement. Therefore, it may be that every broadcast receiver for home use in the future will also be equipped with a television adjunct by which the instrument will make it possible for those at home to see as well as hear what is going on at the broadcast station."

Less than four years later NBC's experimental television station, W2XBS, carried to a group of spectators in New York the voice and movements, on a tiny

screen, of Secretary of Commerce Herbert Hoover as he sat at his desk in Washington. Television was still in the laboratory stage, but it was on its way.

Meanwhile, Sarnoff's restless, probing mind and apparently inexhaustible energies were carrying him forward both in perfecting and improving radio, and in advancing the fortunes of RCA. The company's chief drawback in these developmental days was that it had no manufacturing facilities of its own. It was primarily a sales agency for General Electric and Westinghouse. For the good of RCA, Sarnoff decided, that arrangement must be changed.

In 1929, Sarnoff successfully concluded one of the major deals of his life in buying the Victor Talking Machine Company, whose listening terrier, Nipper, and slogan, "His Master's Voice," was the best known trademark in the phonograph business. The experts were still skeptical about Sarnoff's contention that radios and phonographs were not natural competitors, but they changed their minds when RCA became the largest producer of records in the country, and eventually combined radio and phonograph in one home instrument, just as Sarnoff had predicted. The manufacturing and additional distribution facilities that were part of the Victor acquisition were also a part of Sarnoff's plan to acquire manufacturing strength.

Although the government antitrust action of 1932 forcing General Electric and Westinghouse out of RCA was a frightful blow, Sarnoff had built so well that he



was able to pull the company out, in spite of the Depression and nearly \$18,000,000 in debts resulting from the dissolution. He instituted severe economies, sold the company's control of RKO, and with these and other maneuvers contrived to get RCA into a position where it could take superior advantage of the new boom in network radio.

Good times or bad, Sarnoff had absolute faith in himself, his ideas, and his vision of the future. It was he who backed the work of Dr. Vladimir Zworykin, the Russian-born engineer who was responsible for the development of the all-electronic system for television that is the basis of the modern instrument. Sarnoff had known about Zworykin as early as 1923, when the engineer, then working for Westinghouse, applied for a patent on a device called the iconoscope, the retina of the television eye.

Six years later, when Zworykin was on RCA's payroll, he discussed the all-electronic system with Sarnoff, agreeing with him that this was where the future of television lay, rather than in the mechanical image-scanning systems used in television. Sarnoff told him to go ahead and work on the development of such an electronic system.

"He asked me how much money I needed," Zworykin recalled later. "I pulled a figure out of the air—\$100,000. He said 'Okay.' Years later, when the general had spent \$20,000,000 of RCA's money on television, and we were still experimenting away, he said

he was just beginning to realize what a good salesman I was."

"I knew that \$100,000 was only the price of admission," Sarnoff remarked not long ago.

It was characteristic of Sarnoff that in all his business maneuverings and preoccupation with scientific development, he did not lose his vision of what radio ought to be—a means of bringing culture and education to the ordinary citizen, as well as entertainment. Radio had its soap opera and its sports and its light entertainment, but it also had its cultural achievements, and most of them were instigated and encouraged by the president of RCA—as he became in 1930, at 39, succeeding General James G. Harbord, the retiring president of RCA who continued to serve as chairman of the board.

One of his early and striking successes in this direction came in 1928, when he established the weekly Music Appreciation Hour, under the direction of Dr. Walter Damrosch, the venerable conductor of the old New York Symphony, referred to lovingly by some of its members as "the barefoot Philharmonic."

All over America, on Fridays, schoolchildren gathered in classrooms and listened to the broad, cultured voice of Dr. Damrosch, unfortunately lending itself so easily to satire, saying, "Good morning, my dear young friends, and welcome to the Music Appreciation Hour." What followed, although it was sometimes derided by intellectuals, was an educational ex-

periment of the utmost value and benefit. Children who had never heard a symphony orchestra play, and if they had would not have understood anything about the music they were hearing, now were led step by step to an appreciation of that music. Most of the young students who came to these classes unwillingly remained to listen with growing wonder as Dr. Damrosch unfolded the glories of the standard repertory. Older Americans, who grew up in small towns remote from any semblance of cultural activity, still remember these sessions with pleasure and appreciation for the new world opened to them.

Three years later Sarnoff satisfied a personal ambition when he arranged for NBC to broadcast directly from the stage of the Metropolitan Opera House on Saturday afternoons. After these first performances in 1931, the Met was a fixture on the NBC schedule for many years until it moved to another network.

Sarnoff's crowning achievement in bringing music to the millions was the creation in 1937 of the NBC Symphony Orchestra, an organization formed exclusively for radio, and for one conductor, Arturo Toscanini. The creation of this orchestra was a masterwork in itself. Armed with NBC money, the company scoured the country for the finest musicians available, and when the orchestra was completed, it represented a cross section of the best symphonic organizations in the nation who had given up some of their best musicians, attracted not alone by the excellent salaries but by the

opportunity to play exclusively under the world's foremost conductor.

Toscanini himself had been lured from retirement, after leaving the New York Philharmonic's podium, by the promise of a superb orchestra created especially for him. His contract provided that he could refuse to conduct if he did not like the orchestra. Naturally, there was some apprehension among Sarnoff and his associates, knowing the maestro's perfectionism, that their money and effort might be in vain.

When they walked up the gangplank to greet Toscanini upon his return from Italy, the maestro's first words were: "NBC Orchestra very good, first clarinetist not so good." Sarnoff and his aides were astonished until the maestro, with the gleam of sardonic humor he sometimes displayed, disclosed that he had been listening in Milan by shortwave to the preliminary concerts the orchestra had been giving before the arrival of its permanent conductor. The story is that Toscanini himself took the erring clarinetist in hand and personally coached him into being a first-class first-chair clarinet man.

That year, 1937, had been a milestone for Sarnoff. Not only had there been the creation of the orchestra, but he had persuaded the noted educator and former president of Yale University, Dr. James Rowland Angell, to become educational counselor for NBC. The subsequent experiments in education by radio that NBC made under Dr. Angell's direction laid a solid ground-

work for much of what educational television is accomplishing today.

Then, early in 1937, Sarnoff had sat down at a desk in NBC's first television studio with Lenox R. Lohr, then president of the network, and Grover Whalen, president of the forthcoming New York World's Fair, and signed a contract committing RCA to participation in the 1939 Fair. He was already planning to make that participation the start of regular television service in the United States.

Before the fair opened, RCA's experimental television broadcasts had already produced some notable programs. Mobile television units had been developed as early as 1937, a year in which the studio staged about 130 demonstrations. Occasionally Sarnoff himself appeared in demonstrations, as he did in 1938 when the late John Golden, the noted Broadway producer, appeared with him before the cameras to discuss the new art and pronounced it as bringing "a new and glorious era in the world of the theater." That December, the NBC cameras were at the National Automobile Show in New York, and the promised era seemed, indeed, about to begin, as it did the following April, when the World's Fair telecast began with President Roosevelt's address, the first time a Chief Executive had been seen as well as heard on the air. Then, standing before a single camera and a pair of microphones, Sarnoff spoke. It was one of the proudest moments of his life, and a very long way indeed from Uzlian.



RCA

*First commercial telecast, New York World's Fair*

"On April 30th," he announced, "the National Broadcasting Company will begin the first regular public television program service in the history of our country; and television receiving sets will be in the hands of merchants in the New York area for public purchase. A new art and a new industry, which eventually will provide entertainment and information for millions, and new employment for large numbers of men and women, is here.

". . . And now we add radio sight to sound. It is with a feeling of humbleness that I come to this moment of announcing the birth in this country of a new art so important in its implications, that it is bound to affect all society. It is an art which shines like a torch of hope in a troubled world. It is a creative force which we must learn to utilize for the benefit of all mankind."

The new era Sarnoff had been predicting for 17 years had begun.

## *Chapter 7*

# Sarnoff and Science

**F**or a man who is not himself a scientist, David Sarnoff has been as close to the physical sciences as any human could be. He has built his career on them, a fact that has sometimes been obscured by his business genius; and if it were not for the many other facets of his personality, he could have spent his life in the laboratory, had he chosen.

His relation to science and scientists has been unique because he dwells in the scientific world without being actually a member of its community. He speaks the language, he understands the processes, but always his mind is a step beyond the laboratory in the realm of creative ideas that are not necessarily scientific. He could, for example, understand the scientific thought that went into the creation of television, but his mind





RCA

*With George S. De Sousa, his first Marconi Co. boss*

leaped at once to how it might be brought into the home, how color could be added, how color television could be transmitted around the world by satellite. He dreams the dreams, presents them to his engineers, and asks them to deliver. They have never failed him.

Long ago he established a practice of asking the engineers and scientists in the RCA laboratories to produce for him what might be, even to them, new and startling developments. Perhaps the best instance of these interacting elements at RCA is the story of Sarnoff's 45th anniversary dinner in the radio industry, an event that took place in 1951 at the laboratories in Princeton, New Jersey, which are named for him. In his speech that night, the General asked his assembled staff members to give him three gifts for his 50th anniversary, five years in the future.

He wanted, first, an electronic amplifier of light, to which he had already given a name—Magnalux. If the engineers could use amplifiers to magnify the intensity of sound waves, he observed, then they should be able to make an amplifier to intensify and create stronger light waves. For this invention he saw an immediate application in television, X-ray, and an almost limitless extension into other fields.

This, in itself was a splendid example of the Sarnoff mind at work as a unique bridge between science and industry, but he had two other gifts on his list. The second was a magnetic tape recorder for both black-and-white and color television, which would record

sound and pictures at the same time and replay them at will; and the third was an electronically air-conditioned room, employing a system without any moving parts.

When the 50th anniversary was held on September 30, 1956, at the Waldorf-Astoria Hotel, RCA's engineers had their gifts ready for the General. The true amplifier of light was presented first. It was a panel resembling a picture frame turned toward the audience and showing a portrait of the General himself. The light image falling from the projector on the reverse side was a thousand times less bright than the side of the panel turned toward the audience.

As Dr. Elmer W. Engstrom, then senior executive vice-president and now president of RCA, remarked to the guests, this gift had its immediate practical uses. For one thing, it would enhance the presentation of radar screens, providing bright pictures instead of the current dim images and also helping "as we move in the direction of seeing in near darkness."

The light amplifier had another use, Dr. Engstrom went on. It could be harnessed to the fluoroscope screens used by industrial radiologists, amplifying the image a hundred times, which meant that the subject and the radiologist would be exposed to a lower dosage of X-rays, and the radiologist could work in a lighted room instead of darkness. Further developments could make the light amplifier equally useful in medical X-rays, Dr. Engstrom added.

Sarnoff's second present from his engineers was the magnetic tape recorder for both black-and-white and color television. They had anticipated his birthday by making a public demonstration of this device two years before. At the time of the dinner it was still being tested in the NBC studios, but it shortly afterward became available to the industry and caused something of a revolution. Today the taped show is a commonplace and has had a profound effect on the whole structure of television broadcasting.

Having finished so far ahead of the deadline in the case of this particular gift, the engineers went on to produce something else with it: a prerecorded tape for use in the home—what the company calls a “hear-and-see” player. This instrument takes magnetic tape on which either phonograph records (or television programs) have been prerecorded and plays them back through a standard television set, so that people may see as well as hear the artist on the record. The logical next step, Dr. Engstrom noted, would be to develop the equipment so that it would record television programs off the air at home, so they could be seen again at will. Obviously the difficulties in putting these devices on the market are formidable, involving a jungle of legal complications as well as affecting other operations of the company, but the technique is ready.

Nor was that the end of the applications of this single invention. “A further development,” Dr. Engstrom went on, “is to have a simple . . . camera so that

we can by electronic photography make records of our friends and our family and immediately play these back on such a player through our television receiver."

In producing the General's third gift, the electronic air conditioner, RCA's engineers came in through the back door, so to speak, and invented first an electronic refrigerator without moving parts, and consequently noiseless, with a cooling compartment for food and a freezing compartment for ice cubes. The electronically air-conditioned room, which was demonstrated next day at Princeton to the General and the press, again employed no moving parts. The cooling, accomplished by wall panels, was essentially draft-free, a highly desirable situation in air conditioning.

Responding to the presentation of these wonders, the General remarked amiably: "A few of the scientists and research men who heard me make these specific challenges to their ingenuity wondered if I quite grasped the toughness of the problems involved. If I did, they said, I might not have had the gall to set a five-year time limit for their solution. But I have often had more faith in these men than they had in themselves. I had no doubts that they could solve these problems, and I even thanked them in advance for the presents I confidently expected to receive tonight. Of course I realize that in part they are still in what engineers call the developmental stage. But the fact remains that in five short years they have succeeded in turning what were bold dreams and hopes into proud realities."



RCA

*Visiting RCA's Rocky Point station with Marconi*

Sarnoff, in these words, aptly summed up his relationship to science and scientists for the past half-century. He has been the friend of many of them, and as he says, the greatest were "plain, humble, friendly men."

"My chief impression of Marconi was always of democracy," he once recalled. "I remember one day an Italian boy came in to shine his shoes. Marconi got interested in something the boy said and detained him for half an hour, talking to him eagerly in Italian and shaking hands when they parted.

"The greater the scientist is the humbler seems to be his attitude. If you asked Steinmetz, 'What is ether?' he told you that he wished he knew. A college sophomore, on the other hand, would answer glibly that ether is a medium through which electric waves travel."

When Steinmetz, Langmuir, and Einstein were being shown the new radio station at New Brunswick in 1922, Sarnoff remarked that Einstein, instead of making new prophecies about radio, seemed almost awed by the magnitude of the concrete development of theories that he understood perhaps better than any of the others. He lived in the realm of theory; to see the theory realized impressed him nearly as much as it would a layman.

At the 1922 affair, Einstein, Steinmetz, and Langmuir rode out to New Brunswick together in an automobile and, according to Sarnoff, "they carried on an astonishing conversation in three languages—German,

French, and English. A rapid fire of ideas went back and forth, and the three promulgated theories and problems enough to keep the rest of the scientific world busy for a generation. They discussed the internal structure of atoms and the inmost secrets of science in much the same manner that we ordinary mortals would debate what to have for dinner."

Sarnoff was also a friend of John Hays Hammond, Jr., the inventor and electrical engineer who eventually became a director of RCA. "When he gave his first demonstration before officials of the Marconi Company," Sarnoff says, "I remember that the tall young fellow carried all his equipment in a black box and each part was painted black. This was a camouflage arrangement to make sure that nobody would pirate his idea. Hammond was a latter-day descendant of a long line of gentlemen scientists, men of means who might have been content to live without work, but who have wanted to invent for the joy of it. Cavendish and Faraday were among this group; and so was the Marquis of Worcester, who built one of the original steam engines."

One of Sarnoff's favorite stories about Marconi concerns the time the two men were cruising and experimenting on board the inventor's yacht, the *Electra*. "We were experimenting with shortwaves, endeavoring to establish communication with Australia from the English Channel. It was five o'clock in the morning when we finished our experiments for the day. We were about





RCA

*Celebrating 35 years of transatlantic transmission*

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to retire when he said to me: 'David, there is one thing I would like to know before I die—I know *how* this thing works, but I would like to know *why*.' Like many before him he died without an answer to his question."

Sarnoff himself has at least two inventions to his credit, both of them RCA patents. On December 7, 1948, the Patent Office gave him a patent for a secret signaling system; and on October 16, 1951, his second patent was issued, this time for what he called an "Early Warning Relay System," combining the principles of television, radar, and microwave relay, and intended to be applied to "guided missiles and air combat."

At RCA, the General has been the moving figure behind most of the company's remarkable more recent products. He was responsible for the development of the world's most powerful radio station, a 1,200,000-watt transmitter at Jim Creek Valley, in the State of Washington, built for the Navy. In 1953 Sarnoff tapped out the first message to be sent from this awesome installation—a message from Admiral Robert B. Carney, then Chief of Naval Operations, which was received by every Navy ship and outpost around the world.

A year later Sarnoff demonstrated the direct conversion of nuclear energy into electricity by telegraphing a message using power derived from RCA's experimental atomic battery. In that same year he saw the concept of military television he had envisioned 20 years before put to a practical test in a demonstration at Fort Meade, Maryland, where General Matthew B. Ridgway, then

Army Chief of Staff, used a combat-type Vidicon camera RCA had developed for armed forces use.

One of the devices that earned him the accolade of "imaginative cold war strategist" was a hand-operated phonograph capable of delivering three-minute messages, to be used behind the Iron and Bamboo curtains. This was only one of several devices developed by RCA as a result of Sarnoff's marshaling of the company's technical resources several years ago to help the United States government in its propaganda war against Communist countries.

Since radio was the General's first love, his pride in RCA's part in developing the transistor set is understandable. "The master key to the continuing expansion of electronics," he has called it. Sometimes, regarding one of the improved models that the company is constantly turning out, Sarnoff cannot help marveling at how far science has come since the days when he sat at a bench in the lonely Siasconset station on Nantucket, tapping out messages through his wireless key.

Inevitably in conversations about science, the old argument comes up about the supposed conflict between scientific thought and religion. Sarnoff heard that argument as a boy, as boys hear it today, when the faith in which they have been brought up is challenged by the cold, material facts of science. As one who has lived all his life with science and yet retains a strong religious belief, the General's views on this subject are worth hearing.

"The claim that there is an inherent conflict between science and our immortal souls—that science is the natural enemy of the soul—does not stand up under examination," he said. "The man in an airplane is not necessarily less devoted to truth, justice, and charity than his forefathers in oxcarts. Virtue does not necessarily go with primitive plumbing, and human dignity can be nurtured in a skyscraper no less than in a log cabin.

"Science begets humility. Its every discovery reveals more clearly the divine design in nature, the remarkable harmony in all things, from the infinitesimal to the infinite."

Religion and science are not antagonistic in any sense, the General often remarks, when the conversation turns to spiritual values in relation to proved scientific fact. They are, instead, partners in the constant effort of man to learn more about the universe he lives in. They represent two potent but compatible forces, and Sarnoff is convinced that it is only through their union that a world of peace and brotherhood can be achieved.

"But the mortar of brotherhood is not a product of the laboratory," he warns. "It must come from the human heart and mind, and therein lies the crux of man's dilemma. He has not yet learned, as a social and economic creature, to keep step with his science. He is technologically mature, and a spiritual adolescent. Having conquered nature, he must now learn to conquer himself.

"The devices which science has given us are neither good nor evil in themselves. Their capacity for good or evil lies in the use we make of them. Thus, not in the laboratory, but in the human heart, in the realm of the spirit, lies the challenge of the future."

In his view of science and religion, Sarnoff follows the beliefs and ideas of many scientists, particularly the astronomers, who see in the grand design of the universe and the interrelationship of everything in it, the evidence of an infinite Power beyond human comprehension or understanding. In man's efforts to discover the secrets of his own body, of the earth he inhabits, and of the limitless space around him, he is only unfolding, these scientists say, a pitiful few of the details in the Master Plan that makes the universe a cosmic whole, not a haphazard collection of stars and other fragments of matter floating in a cosmos created by accident.

Viewed in this light, the achievements of the greatest scientists are seen in their proper perspective, the General believes. It is enough to make the most brilliant man humble.

## Chapter 8

# In The Public Service

One of the lessons a man learns when he is in the public eye is that his time is not entirely his own. Government calls on his services in wartime and peacetime. Education has its own demands. Most men of eminence in the nation are called upon frequently to offer their knowledge and experience where it can be most useful, and few refuse. Nor is it a oneway transaction. They, too, learn from their service.

Much of David Sarnoff's public service has been involved with the armed forces, dating to World War I, when President Wilson called upon him and the Marconi Company to help equip the American forces with wireless. It was a monumental task, which had to be accomplished in an incredibly short period. Perhaps no other man, certainly no other company at the time, could have done it.

The Army recognized his services in 1924 by appointing him a lieutenant-colonel in the reserves of the Signal Corps on December 11. It was typical of Sarnoff that he did not rest on his commission as a civilian. He meant it to be no empty title, and consequently went down to Washington in 1927, where he completed a course of study at the War College. Four years later, he was promoted to the rank of colonel.

Meanwhile, having done his part to help win that first great conflict, he was called upon to participate in the unsatisfactory business of cleaning up after it. In 1929 he left New York for Paris on the steamship *Aquitania*, as an assistant to his old boss, Owen D. Young, who had been made chairman of the United States Reparations Commission. Other members of the commission included J. P. Morgan, Thomas Lamont, and Nelson Perkins, all internationally famous financiers.

It was one of the three memorable trips Sarnoff has made during the course of his career, as he is fond of recalling. The first was his trip to America as an immigrant boy, and the second his 1908 voyage as a wireless operator on the S. S. *New York*, traveling first class on a route he had traversed by steerage only a few years before. Now, in 1929, he was a member of an important commission appointed by President Hoover to reach final agreement with the Germans on the debts and other problems still unresolved more than a decade after the close of the war. Their task, too, was to replace the Dawes Plan with what later became the Young

Plan, both schemes to put the German reparations problem on some sound and sensible basis.

As Young's assistant, Sarnoff's particular task was to negotiate on behalf of the Allies with the formidable Dr. Hjalmar Schacht, the financial wizard of the German Republic, who represented his country, even then on its way toward a second attempt at conquering the world. The mission was foredoomed to failure, but Sarnoff and the other financial and industrial giants on the commission had no way of knowing it. They negotiated in good faith. Sarnoff's own negotiations with Schacht went on for six weeks, at the end of which he believed that the pressing problems of the time had been solved. So they might have been if the agreement that was signed in Paris had been honored; it was, instead, repudiated by Adolf Hitler, along with the hopes of mankind that it represented.

"The impressive and human part of that trip to me," Sarnoff recalled later "was not only the companionship of these important men, who were much older and wiser than I, but the fact that I was a member of that group, and that we were met at Cherbourg by high officials of the French Government. This time, no passport problems, no baggage problems, no customs problems. Our reception was conducted with the pomp and protocol that the French are so expert in providing. We were taken from a special tender to a private train supplied by the French Government, which whisked us to Paris and the comforts of the Ritz Hotel.



"I shall never forget the moment, during this third trip, when I stood on the deck of that tender, reflecting upon this novel experience. The picture that flashed through my mind then, as it had in 1908, was my first crossing of the Atlantic in the steerage. I thought of the contrast between the two trips and the fact that this could happen only in America. . . . I remember saying to myself, 'God bless America.'"

Sarnoff, of course, could not assess his own work in Paris, but Owen Young later wrote of him: "He was our principal point of contact with the German delegation, and he did an extraordinary piece of work in negotiating for us with them. . . . One could easily see that each man in the group of American delegates and experts was effective and at one time did a job that saved that conference; each seemed to have a part in the crisis which prevented it from being wrecked, and that can be said of Sarnoff in particular, for there came a time when only one man could save the situation, and that arose toward the end with Sarnoff and the German delegation." Sarnoff did the necessary saving.

When World War II came, wrecking the hopes alike of the commission and mankind, Sarnoff not only threw the immense resources of RCA behind the war effort, but also put on his uniform. After a short time in the office of the Chief Signal Officer in Washington, he was assigned overseas, where he served as Special Consultant on Communications to General of the Army Dwight D. Eisenhower, at Supreme Headquarters. There

he was nominated for promotion to Brigadier General in November 1944, a rank that the Senate approved on December 6.

If his grandchildren ask him what he did in the great war, the General can show them the letter General Eisenhower wrote to him when both men were still at SHAEF. It read:

“Your contribution in anticipating and preparing proper communication facilities for the Press prior to D-Day and immediately thereafter was notable, and your initiative in reopening Radio Paris deserves commendation.

“You have, as Acting Chief, Communications Section with the United States Group-Control Council, placed the benefit of your years of experience in the field of world-wide communications at its service, and this guidance will undoubtedly contribute to the Council’s future success.

“I wish to express my sincere appreciation at this time for the services that you have rendered to your country and to this headquarters.”

Two Presidents followed General Eisenhower in honoring Sarnoff for his services. President Roosevelt awarded him the Legion of Merit in October 1944, and in February 1946, President Harry S. Truman presented him with the Medal of Merit for services “of inestimable value to the war effort.” The citation went on to commend him for placing “the full resources of his company at the disposal of the Army whenever needed,



PRESS ASSOCIATION, INC.

*Planning for D Day with one of Eisenhower's staff*



SIGNAL CORPS, U.S. ARMY

*Congratulations on reaching rank of general  
from General H. C. Ingles,  
Chief Signal Officer, U. S. Army*

regardless of the additional burden imposed upon his organization. He encouraged key personnel to enter the service, and at his direction RCA engineers and technicians rendered special assistance on numerous complex communications problems. He fostered electronic advances which were adapted to military needs with highly beneficial results. . . ."

While he was in Europe, the General's astonishing brain was, as usual, leaping beyond the problems with which he had to deal at the moment. He has never been a man to confine his planning to one thing at a time. Thinking about how America might better make her voice heard abroad, he conceived the idea of a radio program that later became the Voice of America. President Roosevelt was told of the idea, but it seemed better suited to him as a postwar propaganda device. Sarnoff uses the word "propaganda" in its best sense. As one of the Voice's most ardent advocates, he believes that it is one of the ways by which better communication between men can take place, and that has been the purpose of his life.

Whenever the government has turned to Sarnoff for help, his response has always been extraordinary, and never more than in 1955, when the military reserve program appeared to be faltering, and President Eisenhower named the General as chairman of the National Security Training Commission in an effort to get the program moving again. The promotion drive Sarnoff organized was a model of its kind, in which the entire

resources of the National Broadcasting Company were used in the most lavish and imaginative way possible. More than 6,000 radio and television programs, worth nearly \$2,000,000 in air time, were employed to boost the reserve program. Television's brightest stars—such entertainers as Dinah Shore, Perry Como, Garry Moore, Phil Silvers, Martha Raye, and Ed Sullivan—became “recruiting officers.” The nation was made reserve-conscious overnight, and enlistments showed a phenomenal increase. When the drive was over and the Defense Department had pronounced it a complete success, Sarnoff, an advocate of economy in government, turned back to Congress \$12,000 of the \$50,000 it had appropriated for his work.

The General is constantly thinking up new ways to fight Communism. In April 1955, he submitted a memorandum to President Eisenhower urging the government to adopt a bold “Program For A Political Offensive Against World Communism” that he had devised. It soon became one of the most widely reprinted and discussed plans in the cold war, appearing as required reading in numerous college courses and in military officer training programs. This and other statements he has made in support of his belief that “the best way to prevent a hot war is to win the cold war” have made him one of the private citizens most often quoted on the floor of the Senate and House.

Sarnoff has enough medals and citations for a dozen men; only a few of them have been mentioned here.



U.S. MERCHANT MARINE ACADEMY

*Reviewing Merchant Marine Academy midshipmen*

One of those he treasures most is a citation from the United Nations, presented to him in 1949, by Trygve Lie, then secretary-general. It was given for his "notable cooperation in the development of public understanding of the work of the United Nations, and for his contribution in the field of human rights through the advocacy of concepts of freedom to listen and freedom to look as fundamental expressions of freedom of information."

That honor, and one other, he counts among the highest. In August 1961, members of the Senate invited him to Washington for a luncheon on Capitol Hill. As the *New York Times* remarked, "Several Senators present said they could not recall an occasion on which so many legislators had come together to honor a private citizen." There were 32 of them, and Vice-President Lyndon Johnson in the bargain.

The citation given to him that day read: "In commemoration of his dedicated service and outstanding contributions to the advancement of communications and electronics in the United States of America." It was signed by all those present.

Out of all these honors, public and private, and as the distillation of his more than half a century in communications, the boy from Uzlian has learned a great deal to be passed on to the boys from every quarter of the globe who are now coming after him—the Sarnoffs of tomorrow. The General likes to talk about young people, and not in the sententious tones of the



old man giving advice to another generation. He is deeply interested in youth and its problems because they belong to the future, and it is the future that has always fascinated him.

"The most important factor to keep in mind is to continue your education," he likes to urge youngsters who come to him for advice. "Science and industry will reward you for your talents and energy. Out of your efforts may come new inventions, new products, new processes and services. There is everything yet to be accomplished in our lives and in our work. What man has done, man can do better.

"Accept the fact that the only certainty in your lives will be change—and you will be in a better position to assimilate it without mental indigestion and moral confusion."

The General is concerned because so many young men today seem to be preoccupied with security. "Some young people," he says, "have adopted Ferdinand the Bull, smelling flowers from dawn to dusk, as the symbol of the good life. I have been disappointed, at times, to find boys in their twenties, or even in their teens, worrying about pensions and old age security when they will have reached sixty-five. There seems to me something unhealthy where youth is so lacking in confidence. Maybe we have to re-learn the meaning of ambition and of struggle. When has anything worthwhile been attained except by overcoming obstacles? And the thrill, believe me, is as much in the battle as in the victory."

In his vigorous 70's himself, in spite of recent serious operations, Sarnoff has no patience with retirement, for himself or anyone else, although he recognizes it is not the same for every man. "It depends on what he is doing and what he has to offer." A man who retires because he is tired of his job is headed for misery, Sarnoff believes. "If he could retire from himself, that would be fine." His advice is: "Change—don't retire. Find another place where you can express yourself. To retire to self-indulgence doesn't mean anything."

The General has further sound advice to offer young men. He notes how curious it is that problems, crises, and conflicts that seem the most distressing when they are happening are among the most satisfying of memories when they enjoy the perspective of time. "I offer this consolation in passing," he says, "by way of consolation to young men and women wrestling with tough problems today."

As for careers, says this man whose own career has been so remarkable, state of mind is a highly important factor. It is quite possible, he thinks, for a man to condition his mind so that it either enables or prevents him from going forward and doing things. "You can poison your own mind and limit your own capacity. Don't admire the fellow who says he has an open mind—it is usually a mind with nothing in it. A man who has a state of mind based on knowledge and wisdom, experience and reason, has won half the battle. State of mind based on balanced judgment is a precious pos-

session, but being unreasonably optimistic means nothing to me, nor does being excessively worried."

His career advice, Sarnoff says, could be summed up in four simple rules, which he has followed through his own life:

1. Work and live in such a manner that you will be able to serve others.

2. Plan, so that you will be able to advance something.

3. Achieve, so that you will leave the world a little better than you found it.

4. Find as much peace of mind as you possibly can, for that is happiness.

Again and again in his speeches to young people, the General emphasizes the importance of education, particularly in science. America, he thinks, is still a nation of scientific illiterates whose great achievements have been the work of a relatively few men. There is need for a great outpouring of young scientists to meet the challenges of today.

"To me," says Sarnoff, "it has always been a curious fact that we, as a people, do not regard science as a part of education. No man can be considered educated, in the sense that this age must think of education, if he does not know why an airplane flies, or how his telephone works, or what happens when he turns his radio on.

"Science is changing the world, and most Americans neither know nor care how these changes are being brought about. Today every officer of government, every

lawmaker, is confronted with all sorts of scientific and technical developments which affect the political, economic and social problems that are a government's main concern. A businessman, no matter what his field, is confronted every day with technical and scientific breakthroughs that may threaten him with disaster—or hold out the promise of great achievement. Yet lawmakers and businessmen alike must turn for advice to technical people whose language they may not even understand.”

To bring up a new generation of scientifically literate Americans, the General believes, it will be necessary to begin with children at an early age and expose them to the drama of scientific exploration. He is an advocate of bringing the best scientists out of their research laboratories from time to time to teach and inspire young students, who will make the great discoveries of the future.

As usual with his beliefs, Sarnoff has a plan to make this dream a reality, and at RCA he has set an example that he hopes others will follow. For some time now scientists from the company's various laboratories have been appearing at junior and senior high schools in New York City, in a series of lectures and seminars. These sessions are fitted into the regular curriculum, so that it will not be disrupted, but the idea is to stimulate the students' intellectual curiosity, to push their minds beyond the textbooks to the edge of the unknown. That, as the General well knows, is where there is excitement and challenge.

Sarnoff emphasizes how easy it would be to carry out his idea everywhere in the country, since more than 60 per cent of American scientists work for industry or government in laboratories and workshops well distributed over the states, nearly always close by to school systems where often their own children go to school. Ironically, in many of these same schools students cannot get a scientific education because there is a shortage of trained teachers.

Sarnoff first made his proposal for an industry-science teaching program in January 1956, when he was being presented with the Forrestal Memorial Award in Washington. He suggested that the program be tested on a five-year basis at the high-school level. Characteristically, he kept plugging away at it, reiterating the plan three months later before the Subcommittee on Research and Development of the Joint Congressional Committee on Atomic Energy, and again in January 1958, before the Preparedness Investigating Subcommittee of the Senate Armed Services Committee.

To those who were skeptical of the time and administrative effort it would take to implement the program, Sarnoff said simply: "The beginnings of great strides in progress often have been found in tiny seeds. The steam engine was born in a tea kettle. The airplane came out of a bicycle shop. The first automobile sputtered and moved in a carriage shop. Broadcasting started with an amateur station in a private garage. Today the architects of the future must be sought among the

young people in the schools of America. It is of vital interest to the nation that their vision be stimulated, and that paths be opened to them for its realization.”

When no action was taken on his plan, Sarnoff proposed it all over again in January 1962, in an article in *This Week* magazine. Then he presented it personally to Mrs. Anna Rosenberg, former assistant Secretary of Defense, later a member of the New York City Board of Education. She in turn took it up with other educators, and the result was a luncheon meeting on March 8, 1962, in Sarnoff's private dining room, where seven New York public school officials discussed the idea and agreed unanimously that the city school system and RCA would formulate a pilot program to operate during the 1962-63 school year. Thus the David Sarnoff Industry-Science Teaching Program came into being.

Its aims are simple, but exciting and far-reaching. It will demonstrate how student interest in science studies and science careers can be increased through classroom presentations and after-school demonstration lectures by scientists and engineers from industry. The job of these industry representatives is to project the present and future horizons of science and technology in their own special fields.

At the end of the school year, results were then evaluated by the Office of Science Education and the Bureau of Educational Research of the school system, and further plans made.

There must be thousands of scientists, Sarnoff is certain, who would be glad to give a few hours of time a week to schools in their own communities, and he thinks the companies ought to be happy, in their own self-interest if for no other reason, to pay the cost.

In a young man's equipment for a successful life, using "success" in the Sarnoff sense, there must be more than knowledge, however; there must also be wisdom, and he makes a distinction between them. "I believe that knowledge is not necessarily a guarantee of wisdom," he says. "Some people who have very little knowledge have a great deal of wisdom, and some people who have a very great deal of knowledge have very little wisdom. It doesn't mean that knowledge is unimportant, or that wisdom would not be helped by knowledge. But wisdom is the combination of experience with life, the attitude of man towards man; it is human understanding; it is character; it is a combination of many things. To know how another person is going to react to a given situation is a product of wisdom, not of knowledge."

The General thinks we have lost in wisdom during the past 2,500 years while we have gone forward in knowledge; and the wisdom we have lost, he adds, lies in our failure to appreciate the fundamental values of life. "The things that we regard as most important today are not as wise as the things that were regarded most important in the past. Our present preoccupations more and more revolve upon our achievements, status,

and what other people think of us. Learning, understanding and spiritual development are not as apparent today. The people of the past were more concerned with spiritual and ethical and moral concepts than they were with particular things."

Sarnoff is not one to grieve over the lost past, however. He admits that there are no modern equivalents of Plato, Aristotle, and Socrates around today; and when we talk of wisdom now, we always seem to find it in the mind of someone long dead. Nevertheless, wisdom will not be dead as long as young minds are trained and directed to absorb today's knowledge, with their eyes set toward the future and their heads in the stars. That is where the Sarnoff eyes and head have been all these years.





## Chapter 9

# A Look at the Future

To look at the future with David Sarnoff is not only to marvel at the technological wonders awaiting us, if the world solves its political and social problems, but to realize how a mind keyed to the future can never be satisfied with the frontiers of the present. It is a reminder, too, that the frontiers are always advancing.

As a young man growing up, Sarnoff confronted a world in 1906, when he got his first full-time job, whose citizens could not even imagine the world of the jet airplane and satellite communication that we know today. But in a half-dozen countries there were men like Sarnoff who looked beyond the limitations of the moment, who imagined and dreamed about what *could* be, and who constantly sought ways to make the future they visioned come true.

That is the reminder Sarnoff likes to make to young people today: the frontiers are always moving ahead and today man is only on the threshold of entirely new technologies. The wonders the world knows today are only the developmental forms of the wonders of tomorrow. Some of those wonders may be still only half-formed ideas in the mind of a boy somewhere today.

"The very fact that electronics and atomics are unfolding simultaneously is a portent of the amazing changes ahead," the General observes. "Never before have two such mighty forces been unleashed at the same time. Together they are certain to dwarf the industrial revolutions brought about by steam and electricity. There is no element of material progress we know today—in the biological and chemical fields, in atomics and electronics, in engineering and physics—that will not seem, from the vantage point of 1980, a fumbling prelude. . . .

"Not labor but leisure will be the great problem in the decades ahead. That prospect should be accepted as a God-given opportunity to add dimensions of enjoyment and grace to life. We have reason to foresee a fantastic rise in demand for, and appreciation of, the better, and perhaps the best, in art, music and letters.

"The job ahead is to assimilate scientific progress, to turn every potential for human benefit into a living reality."

Sarnoff distinguishes between discovery and invention. He thinks of himself as a discoverer, and, like

Columbus peering hopefully at the horizon, he sees a New World ahead. What will it be like? That is the General's favorite topic of conversation. In hundreds of interviews, speeches, and statements he has outlined the shape of the world of tomorrow, speaking with the authority of one who has been an accurate forecaster of things to come for more than 50 years. Bringing his vision of the future into focus, here is the world he envisions in the next two decades, give or take a few years.

Global television, already a reality, will be perfected and seen in full color, using the system of orbiting satellites which Telstar and Relay had presaged. When this system is in full and satisfactory operation, there will be no potentially fatal delays in communications like that which plagued President Kennedy in exchanging messages with Chairman Khrushchev at the time of the Cuban crisis. Instead, national leaders everywhere will be able to sit in their offices and speak to each other face to face through satellite television. Moreover, they will be able to understand each other instantly through automatic electronic translators.

There is television transmission today in 76 countries of the world, and more than 125,000,000 receivers in use. In 10 years, Sarnoff foresees, if the present growth continues, nearly every nation on earth will be telecasting, and there will be 200,000,000 receivers bringing what is telecast to an audience of 1,000,000,000 people. All these people could be watching at the

same time, and simultaneous translation techniques would make it understandable to every listener. Obviously, in a world in which nearly half the population is illiterate or semiliterate, nothing else will or could equal the impact of television on the human mind.

Sarnoff recognizes that this breathtaking aspect of the future is subject to political considerations. The receiving sets are non-ideological, like the satellite relay system, but whether there will be freedom to look and listen depends on mankind's ability to establish that freedom. Characteristically, the General has already proposed some radically new approaches.

One is the use of television for summit conferences among world leaders, employing the medium in the same way telephone conference calls are handled now. "We can visualize," Sarnoff says, "each national leader sitting in his television-equipped office—in London, Paris, Bonn, Moscow, Washington, or elsewhere. A television camera trained on each man will relay his image to all the others for viewing on a split screen or on multiple screens. In addition to conversing back and forth, each will be able to display charts or diagrams, or even films, relating to the questions on the prearranged agenda and he will see those which any of his conferees wish to project.

"When closed sessions are desired, the television transmissions could be scrambled and decoded by special equipment at each capital, using the same security techniques now widely employed in military and

some commercial communications. When there was no need for secrecy, the conferences could be available for all to see and hear. With people everywhere riveted to the television screen, the leader of a Closed Nation might well think twice before blacking out his own country from an event of such magnitude—and one in which he himself participated.”

But it will be important, Sarnoff believes, to establish a *continuing* global television project of compelling importance, and the answer to that may well be making a channel available for use by the United Nations when the satellite communications system is functioning. Then the only existing world forum where ideas are publicly exchanged and debated could be seen in all its strengths and shortcomings by the people everywhere who make it possible.

In the field of atomic science and electronics, the possibilities are almost limitless. Sarnoff himself has already transmitted radio messages through a device using a tiny atom-powered battery as its power source, but that is only a fractional beginning. Atomic waste products, already a problem in industry, could be used by homeowners as a power source. These products, sealed and buried in one small container under a house, could provide all the power needed by an average household for a period of 20 years. Similarly, atomic fuels extracted from relatively inexpensive materials are certain to be used everywhere in industry, and in all kinds of transportation—airplanes, trains, ships,

and automobiles. If this sounds visionary, Sarnoff merely points out that the direct conversion of atomic energy into electricity has already been demonstrated experimentally by RCA.

The prospects for nuclear fuels in transportation are particularly exciting. Both jet and rocket-type vehicles using these fuels will be capable of speeds as high as 5,000 miles per hour, and with greater safety and comfort than is known today. The cities of the world will be only a few hours apart—in some cases, commuting distance. The inexpensive personal airplane will come into its own and revolutionize travel, just as Henry Ford's flivver did at the beginning of this century. While aircraft will span the continents, automatically piloted, guided missiles will be transporting mail and freight all over the world.

Solar energy, in its way, will be as important as nuclear energy. The sun's rays will be harnessed and made to serve man, particularly in tropical and semi-tropical regions, where most of the developing nations lie. Solar power will be the answer for these nations, which now cannot afford to utilize fully the present fuels and sources of power.

Sarnoff has no fear of the effects of automation, which are already being felt by the American economy. Instead, he predicts automation will "reach a crescendo under the impact of cheap and abundant power. It will increase production, decrease costs, and make more goods and services available to more people.

The transition will create problems of adjustment, but ultimately automation will free millions of people from arduous and hazardous work. It will increase employment, reduce hours of labor, and increase leisure."

Automation processes will be applied, among other things, to the new products that advances in chemistry will provide, and some of these are certain to be spectacular—new plastics and ceramics, new lubricants, new substances still in the laboratory, and all available to meet any possible specification that man can imagine.

Illumination will be revolutionized by electroluminescence, or cold light, which is even now emerging from the laboratories. It provides light without heat, almost without shadow. Its glow will be easily controlled to provide any nuance of intensity or color desired. It can only be imagined how the appearance of factories, streets, stores, highways, and homes will be changed by cold light. On the highway, especially, it will be important because its glareless quality will help to eliminate the perils of night driving and flying. Cold light will also give us brighter and larger television pictures. Before long it will replace the television tube completely, so that the picture of the future will be seen on a thin, flat-surfaced screen hung on the wall like a picture.

New developments in irrigation and flood control, along with solar energy, the electronic acceleration of germination and growth and new chemical and biological discoveries, will greatly expand the food re-



sources of mankind. The oceans will be farmed efficiently for nutritive products. By this means it may be possible to provide the food required by our exploding world population. If political and economic problems can somehow be solved, it will be possible to eliminate famine from the world.

Human health will be immensely benefited by an alliance of biology, chemistry, and physics, using the new tools of electronics and atomics. This powerful complex will bring about an avalanche of improvements in preventive medicine, and in the diagnosis and treatment of human ills. Biochemistry will provide new drugs to control disease and sustain health, particularly in old age; consequently man can expect to see his life span extended even farther, and in another quarter-century life expectancy may well approach 100 years.

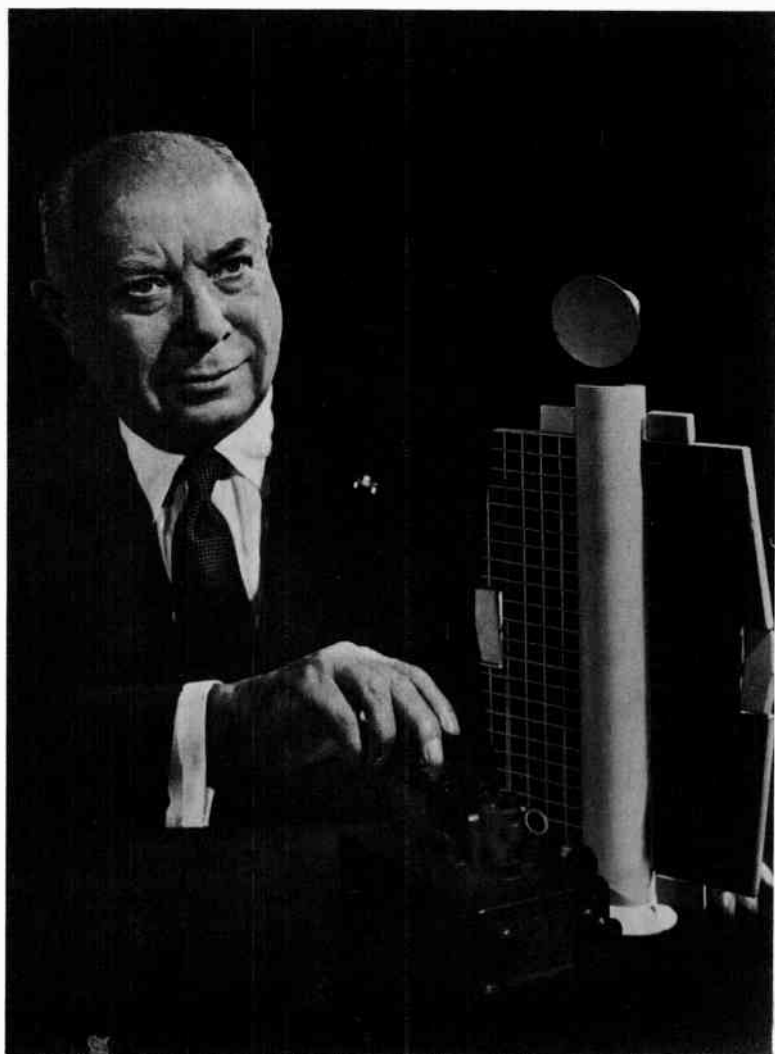
The housewife will not only be healthy, but she will no longer be burdened with routine chores. These chores will be pre-scheduled every day, with all the tasks performed electronically. Temperature, humidity, and velocity of air in every part of the house will be kept automatically at the desired level, day and night. Bacteria and other contaminations will be removed from the air. Cooking and dishwashing will be done electronically, and waste will be disposed of the same way. "Fortunately," Sarnoff adds wryly, "we shall continue to do our own eating."

As he controls the climate of his home, man will also control the climate outside it. Major steps will

be taken to make and control weather as desired. Ice-bound ports will be unfrozen, icebergs melted. Storms, even those of hurricane intensity, will either be diverted from a destructive course or dissipated, although it is possible that another 20 years will see only substantial progress, not realization, in the achievement of complete weather control.

Electronics and computers will be married in an alliance that is going to revolutionize professional life, particularly that of doctors. Already Sarnoff visualizes a television Medical School of the World, with doctors from every country watching surgical operations, hearing lectures, and witnessing demonstrations by leading specialists. These will be telecast via closed-circuit television in full color. "Worldwide medical television," he says, "would permit a heart specialist in London to examine a patient, display on the television screen his X-rays and cardiograms, and discuss a diagnosis with heart men in New York, Paris, Berlin, anywhere."

Computers, with their electronic memories, will provide through the worldwide storage of information an instantaneous review of anything a doctor wants to know about new developments in his specialty. Other computers will store the medical records of every patient, everywhere. A physician in Seattle need only dial a patient's code number to get his complete medical history, although he may have been treated previously in New York, or even London.



RCA

*With scale model of RCA synchronous satellite*

Electronic devices like the one that presently keeps several hundred cardiac cases alive by stimulating weak heart muscles to pump regularly can also be applied elsewhere in the body. "Some day," Sarnoff says, "devices like this may operate other human organs—the lungs, for example, or the kidneys. In fact, it is probable that the time will come when there will be complete electronic substitutes for worn-out human parts."

Computers will serve other professions as well as the doctors. The world's great law libraries, for example, will be codified and programmed into a computer, and the information retrieved in any language a lawyer seeking information might speak. In international law, a lawyer in New York could find out instantly what laws, regulations, and court decisions were pertinent to any case anywhere in the world. Research scientists would be similarly benefited.

The ultimate in communications on earth, Sarnoff believes, will come when men anywhere can speak with each other face to face. "A man equipped with a vest-pocket receiver-transmitter will connect with a nearby switchboard and be able to see and hear another man, similarly equipped, anywhere in the world. The channels available for this run into billions, and each individual will have his own private frequency, just as he now has a telephone number."

Speaking to the National Press Club in 1961, Sarnoff startled his listeners, who are not easily startled, by producing a pocket-size color television set, with

combination AM-FM radio—a mock-up put together by RCA's Advanced Design Center. It was, as he pointed out, the forerunner of a universal communications instrument.

"The date of its availability," he told the newspapermen, "depends upon the time required to learn how to reduce further the size of certain components. I am bold enough to predict that it will be several times smaller than this, and it will consist of both a receiver and a transmitter, radio, television, AM, FM, black-and-white, and color.

"This prototype model is a symbol of our reach for the diminutive. I believe you will someday see transmitter-receiver units a half or third the size of this. Each receiver will have a decoding unit, responsive to only one of a million or more arrangements of pulses sent out from a transmitter, which means that you can be called while you have this in your pocket. . . . With complete privacy, a foreign editor in his office will one day be able to see and talk with a foreign correspondent in an airplane over Tokyo, in a boat on the Red Sea, or in a tractor at the moon camp."

That day appeared considerably advanced only two years later, with new developments in the use of the intensely powerful light generator known as the laser, which is light amplification by stimulated emission and radiation. The laser can produce a hot, needle-like beam that has already been used in human surgery, and that has opened a whole new world to the com-

munications industry. Several types of lasers are under development; some are already on the market.

What the laser means to universal communication is an infinite broadening of frequencies, hitherto limited by the fact that sound and sight transmission has been accomplished only through electromagnetic waves, of which there are a limited number. "The use of laser," Sarnoff told an interviewer in 1963, "will make available an unlimited number of frequencies, enough for everyone in the world. Such a system will be in use in the decade ahead."

Thus the rapid pace of technology, moving so fast now that the General's forecast of "some day" in 1961 had to be shortened to "the decade ahead" in 1963, as the result of only three years of development.

Man's conquest of space is presently engaging much of Sarnoff's attention. He sees it as the next step in communications: "We will achieve the *earthbound* ultimate when we have direct man-to-man communications, both sight and sound, to any place on earth, regardless of distance. And we will achieve the *universal* ultimate when we have man—and possibly other species of life—exchanging communications over distances of millions of miles."

Sarnoff sees the history of communications as having progressed through successive phases. Phase One was the establishing of communication between a fixed point on land and ships at sea, and between ships themselves, or between two land areas across the oceans.



KARSH, OTTAWA

*With mock-up of pocket TV set with FM and AM radio*

Today this phase has been extended to all kinds of moving vehicles in touch with fixed stations and relay points on land.

Phase Two brought voice and music to listeners through radio broadcasting.

Phase Three brought what Sarnoff calls "a stretch-out of sight"—that is, black-and-white and then color television.

Phase Four is global television, and the problem there is no longer one of "how" but of "when."

Phase Five will be directed to communications with the moon and beyond. "Here," says Sarnoff, "we will be concerned initially with communications as a control and intelligence mechanism. This function will be crucial to the successful placing of men on the moon and, ultimately, on distant planets."

RCA has developed its own concept of a moon shot. It envisages the establishment of a well stocked camp on the moon before the first man gets there. The camp would have food, water, power, laboratory equipment, an exploration vehicle, appropriate emergency survival tools, and a reentry capsule for the manned trip back to earth.

The General describes this operation further: "A combination of a Saturn rocket and ground control devices should make it possible to put on the moon's surface a roving vehicle and to conduct a survey for the most appropriate area for a manned landing. This would be based on such factors as terrain, illumination,



temperature, and other environmental characteristics. Then, through a series of subsequent Saturn shots, the camp could be established by sending up the necessary equipment and supplies, including a moon-crawling tractor for assembly purposes. This entire operation could be checked out by instrumentation controlled from the ground before we commit men to lunar flight.

"The success of this plan would prepare the way for exploration of the nearest planets. It would establish a pattern for the construction of other advance bases. In addition, validation of the techniques for storing fuel and refueling vehicles on the moon would lay an effective foundation for use of the moon itself as a launching platform for spacecraft."

Exploring the surface of the moon, Sarnoff believes, would establish whether it was practical to install an interplanetary radio relay station, controlled from the earth and intended to provide communications and navigational links for space vehicles. In spite of the unknown quantities involved—the nature of the moon's surface, radiation hazard from solar flares, the effect of the moon's environment on materials—Sarnoff believes that, in general, "the communications and control problems in this concept fall within our present capabilities."

Phase Five would be complete with sound-and-sight satellites in orbit around the earth, and electronic channels opened to the planets—a long way from the man-to-man communications of Phase One.

Phase Six would complete the circle: direct man-to-man, sight-and-sound communications over the ultimate in distances.

The speed with which these later phases will be accomplished depends in large part on the further progress of miniaturization, the shrinking of electronic gear. RCA has already made striking progress in that field. "Through formidable advances in micromodules," the General reports, "we are achieving new diminutives daily. We can now foresee a computer so compact that it will have a density equivalent to 100,000,000 active elements per cubic foot—a density approaching the compactness of the human brain itself. And this computer, indeed, will perform many functions of the brain."

As exploration develops, space will become a vital factor in the national economy, perhaps the dominant one, Sarnoff believes. He points out that more than 5,000 companies and research organizations are already engaged in civilian and military space activities. They produce, among them, more than 3,200 different products related to space. All the major industries are involved in such production.

To doubters who believe the conquest of space is much farther away than these prophecies, the General recalls that only a little more than 60 years ago, when he came to this country, the telephone was a rarity, the Wright brothers' first successful experiment with the airplane was still three years in the future, and Mar-

coni had not yet received his first historic wireless message across the Atlantic. Then he tells a story to illustrate the impact that science in recent developments has made upon time.

"I was traveling by train from New York to Washington, to a White House meeting with President Kennedy. It was the day Colonel John Glenn made the first orbit around the earth. I walked from the compartment to the dining car at the other end of the train, and in the few minutes this required, Colonel Glenn had flown a distance of some 2,500 miles—from the Hawaiian Islands to the Pacific Coast. In the length of time it took me to travel between my home and Washington, Colonel Glenn had flown 81,000 miles in space, at a speed of 17,500 miles an hour. And I was tuned in to virtually every minute of his flight, by home television, car radio, pocket radio on the train, and hotel television. Not even the most imaginative of science fiction writers could have depicted this reality 50 or even 30 years ago."

Sarnoff is well aware that the primary hindrance to the realization of the world he envisions is political rather than technological, and he has evolved a bold and comprehensive plan to organize and make effective the scientific resources of the free world in changing human life for the better, thus providing a climate of opinion on the globe virtually unassailable. In brief, totalitarian countries would have to "jine us" because they couldn't "lick us."

The General first offered this idea at the golden anniversary banquet of the Institute of Radio Engineers, in New York, in 1962. He proposed an organization to be called The Free World Community of Science, "an organization where competence is the only visa, and capabilities are fitted together for maximum results without regard to nationality." Initially it would embrace the nations of Western Europe, North and South America, Australia, and Japan, although any country permitting free scientific inquiry unhampered by political ideology would be welcome.

This Community of Science would include scientific leaders from the major areas of the physical and life disciplines from all the participating nations. Once established on a permanent basis, it would propose key areas of research, initiate specific research and development projects, and coordinate the resources essential to implement them. Wherever desirable, it would create specialized international research institutes. Functioning with a minimum of political direction, it would be supported financially by funds from the member nations.

In proposing the Community of Science, Sarnoff characteristically outlined the specific tasks he thought it could perform right away. He grouped these research areas into five broad categories, and in them provided still another look into the future.

1. Genetics and heredity. "We have begun the assault on the innermost mysteries of the life process—

decoding the nucleic structure of the living cell, its activities, differentiations, and transmitted characteristics. Knowledge of these basic life functions might make it possible ultimately to alter or modify cellular structures. This action could lead in turn to the elimination of bacterial or viral diseases, and conceivably to more useful strains of plant and animal life."

2. Communications and space. In this, his own area of primary interest, Sarnoff visioned again his system of interconnected high-level and low-level satellites, ground stations, and networks to provide every kind of communication to every place on earth, to space vehicles and the planets beyond. He cited, too, the promise of global weather control.

3. Conversion of saline to fresh water. "Two-thirds of the peoples of the earth live in areas that are water-starved. For millions of them, the presence of a few feet of water spells the difference between life, bare existence, or death. The nations which offer an efficient, low-cost process for large-scale purification of salt or brackish water will possess a weapon as potent as space ships in the battle for men's allegiance."

4. New sources of food. Here Sarnoff emphasizes the possibilities of a "harvest of the sea," which presently provides less than one per cent of the human diet. "The oceans offer an immediate challenge to our proposed Community of Science for improving food supplies by transforming fishing from a nomadic pursuit to an organized farming activity, including the scien-

tific processing of highly nutrient algae and plankton for food purposes."

5. New sources of energy. "Research in atomics, electronics, and other fields is now providing us with the means to convert solar energy, fossil fuel energy, and atomic fission energy directly into electric power. And through further research we shall ultimately learn how to make practical use of nuclear energy. When that day comes, we shall be able to tap the limitless energy sources in the oceans.

"Before too long, many isolated parts of the world will have sources of electricity that will not require large central power stations and extensive transmission systems. When we learn how to convert all forms of matter into energy for practical uses, we will have at our disposal the maximum force in nature. It will then be possible to cleave new coastlines, level mountain ranges, and transform the Sahara or our Southwestern deserts into irrigated gardens."

As an added fillip to his vast, imaginative plan, Sarnoff has suggested the establishment of an international data processing center to assemble, digest, translate, and make available the essential data in the technical papers published around the world, which in one year alone (1962) approached 60,000,000 pages.

In visioning the new world of research and technology that is only now dawning, the General has also from time to time thought of it in terms of its other problems—the common problems that all mankind

faces, in one way or another. These are his beliefs about the way these problems will be resolved in the next 20 years:

Communism will collapse in that time, he believes, because of "its economic fallacies, its political follies, and the pressures of a restive, discontented population." These pressures will be generated by the rise and spread of education, and the Soviet empire will come apart piecemeal as one satellite after another liberates itself. The Kremlin hierarchy itself will dissolve through internal struggles for power. A military dictatorship will replace it temporarily, to be followed by representative government.

Concurrently with this collapse, the Marxist approach to the solving of social problems will decline in the rapidly developing world of technology, and be replaced everywhere by the dynamics of a people's capitalism within a democratic framework.

Living standards without a parallel in the past will be attained all over the world as technical developments create an era of relative economic abundance. Leisure, not labor, will be the problem.

Economic progress and the new leisure will mean that man will enter a period of universal education. As general levels of knowledge rise, the new technology will place a premium on brains—that is, a need for ever more skilled scientists, engineers, designers, technicians, and others. But as this mounting demand enlarges educational facilities, the arts will be promoted

as well as science, as man finds fresh channels for expression.

Every kind of entertainment will be available at home, both live *and* recorded, through television, radio, the phonograph, and electronic photography. Consequently there will be more opportunity than has ever been known for creative and interpretive talents. Programming will embrace everything created by the human mind.

In the field of government, public opinion will be a more decisive element in political life because people will have an unprecedented access to information. Electronic devices will quickly and accurately register the prevailing sentiment on any issue. Thus government and the governed will be brought ever more closely together, and popular government and democratic processes will thus be increasingly effective and efficient.

On the question that is foremost in everyone's mind, the possibility of nuclear war that would end all of mankind's hopes and aspirations, the General has this to say: "Universal communications and speedy transportation will shrink the world to a neighborhood. Technological developments in weapons of mass destruction will leave no doubt that the alternative is between survival or annihilation. All nations will find it imperative to develop and adopt practical means for disarmament based on effective inspection, control, and enforcement. War as an instrument of national policy will be outlawed."



The fantastic, almost overwhelming new world that the General envisages will be the inheritance of today's young people, who will also be the principal shapers of it. The General knows that it will not be easy for them. They will be growing up in years of extraordinary change that will mean serious dislocations of long established patterns of living. Already, in their brief lifetimes, they have seen a tremendous surge in science and technology that has already affected nearly every aspect of human existence.

There is, Sarnoff notes, a general apprehension among young people about how they will fit into the new age of technology. It is more acute, perhaps, among those whose bent is not toward science. Some of the more perceptive high school and college students miss and even envy the seeming certainties of the past, although they may not have personally experienced but only read about them. This feeling has led to a conservative trend among them not typical of youth.

Oddly enough, with so much to be done in the world, many young people today appear to wonder what more is left to accomplish. "I have talked with a great many young people," Sarnoff says, "and some of them have frankly sought advice on their careers and opportunities. On occasion they expressed the fear, like Alexander the Great, that there may be no more worlds to conquer."

It is true that the last of our geographical frontiers disappeared with the present exploration of the Antarc-

tic. The electron and the atom are in the process of being harnessed. Individual skill seems to have lost some of its old importance. The conquest of space moves forward so rapidly that the basic tasks—some young men and women fear—may soon be fulfilled.

Sarnoff's answer to such doubts is unequivocal: "We are only on the threshold of knowledge about the universe that will open up new opportunities for youth and for the advancement of all mankind." It is not only the number and variety of discoveries and inventions in our era that guarantee this promise, the General points out, but the speed of new developments. Scientific progress has accelerated at a dizzying speed, as the events of his own lifetime prove. The technical changes in that period were greater than those made in the 20 centuries that went before. At the present rate, the next decade may well see more change than the five decades preceding it. New words and formulas have to be improvised to keep pace; man's vocabulary of measurement is constantly outmoded. He has had to devise the word *megaton*, for example, to indicate the rough equivalent of 1,000,000 tons of TNT. Similarly the speeds of sound and light were once used only to measure natural phenomena; now they are commonplace measurements of man-made phenomena.

What the young people are feeling today, Sarnoff thinks, is simply another reflection of the feeling adults have—that man has extended his mastery over the material world but is losing mastery over himself. As Al-

bert Schweitzer put it: "Man has learned to control the forces of nature before he has learned to control himself."

Believing that unless we close this gap man will find himself the slave and not the master of the powers he has summoned, Sarnoff asserts: "It is in this reality, in this threat, that one must look for answers to the question raised by young people. An immense amount of vital and rewarding work remains for them to accomplish in order to bring humanity into harmonious relation with its shifting material environment.

"We have built up a staggering storehouse of knowledge about the world around us, but man himself is still shrouded in a smog of misconception and ignorance. We have learned to identify with uncanny accuracy the chemical composition of stardust millions of miles away, but still know relatively little about the composition of cancer cells in our own bodies.

"More important, though man has understood the complexities of the atom, he has largely failed to understand his fellow man. He has learned to see and hear electronically to the outer reaches of space, yet his mind has been unable to cross the narrow boundaries of prejudice.

"More than ever before, therefore, we must give thought to the wisdom of the ancient Greek injunction: 'Man, know thyself!' More than ever before, we must act on the truth that the proper study of man is man himself."

The time has come, the General believes, for a penetrating study of man in all his dimensions, both physical and metaphysical. There must be a concentrated study of body, mind, and soul. As he puts it, "Our preoccupation with *outer* space must be balanced with a purposeful exploration of *inner* space."

That, he conceives, is the paramount task awaiting youth today: "To learn as much about the *Adam* as the older generation has learned about the *Atom*. There are worlds to be opened up and charted *within* ourselves, as exciting as any that we have tackled *outside* ourselves."

What are some of these inner worlds? The mysteries of our bodies constitute one of them. In spite of everything medicine has done to conquer or control so many once fatal diseases, and to improve our health generally, every doctor knows the truth of the remark made recently by Dr. James Watt, head of the National Heart Institute, when he said: "We have blazed a long trail but an uncharted wilderness lies ahead." For example, we know little of the great arterial system that gives us life, and the brain in which it is rooted. We know even less of what causes the sick minds that fill half the hospital beds in this country. More Americans go into hospitals with mental illness than with all the other diseases put together.

Electronics will be the useful tool of the young men and women who go into medicine, as it already is in so many ways. But Sarnoff would not be Sarnoff if he

did not suggest a device still in the future which will be of use to everyone. He says: "Our automobiles and airplanes have dashboards of gauges and meters that give the driver or pilot all the pertinent information about the operating parts and behavior. There is no technical reason why we cannot develop an equivalent 'dashboard' for the human body. It will be a home device, like scales, that will register not only weight but heartbeats, blood pressure, pulse rate, temperature and other basic data. Moreover, it will carry an alarm system advising the user when to consult a physician. The same device will record the daily results on magnetic tape to help the doctor in his diagnosis."

But there is a need to explore the inner man in more than a physical sense. Man must be comprehended as a social, intellectual, and spiritual entity, a job more important and formidable than learning about his physical makeup. Only through such comprehension can we cultivate to its fullest extent the human potential on which our civilization rests.

That prospect excites Sarnoff as much as the idea of radio and television excited him long ago. "This difficult assignment," he said recently, "is replete with the kind of adventures of discovery to stir the imagination of our ablest young people. Human motives, instincts, impulses and behavior patterns have, for the most part, eluded the analysts and statisticians. Vision is clouded by racial and religious animosities unrelated to reason. Too often a sense of purpose is lost in a hur-

ricane of irrational passions. The possibilities for devoted labor in this area are almost limitless."

Such problems require as much courage, imagination, and zeal as any of the geographical or technological frontiers crossed in the past. Once he becomes aware of this challenge, Sarnoff believes, no young student will have any reason to deplore a lack of worlds to conquer. More than that, the General charges youth with direct and personal responsibility for preserving the core values of civilization, and the principles that give meaning to life.

What of Sarnoff now in his 70's, a man who has done so much, seen so much, knows so much? What more—echoing the anxious question of his young friends—is there left for him to accomplish? His answer is characteristically tough and wise, and good enough to guide a young man from his youth to old age: "First you're an apprentice. Then you're an actor on the stage. Then you sit in the audience and applaud. I want to help those around me who have ideas. I've reached the 'audience' stage, but I'm not content merely to applaud."

If there is a single lesson to be learned from David Sarnoff's valuable life, this may well be it: Never be content merely to applaud. That is only for the present. The pursuit is always toward the horizon, toward the challenge and the promise of the future. "Learn from the past," David Sarnoff advises, "do your best in the present, and dream and plan for a better future."

